TRAFFIC QUARTERLY

AN INDEPENDENT JOURNAL FOR BETTER TRAFFIC

JULY 1951

Millionth Victim
New Jersey's Turnpike
Where Our Zoning Stands Today
Truck Taxation in New York State
Future Traffic in the Medium-Size City
DesMoines Tackles Its Parking Problem
Sound Parking for a Suburban Town
New Thruway in New York State
Traffic Plans for Civil Defense
How About Vehicle Speed?
Trucks and Traffic

THE ENO FOUNDATION FOR HIGHWAY TRAFFIC CONTROL

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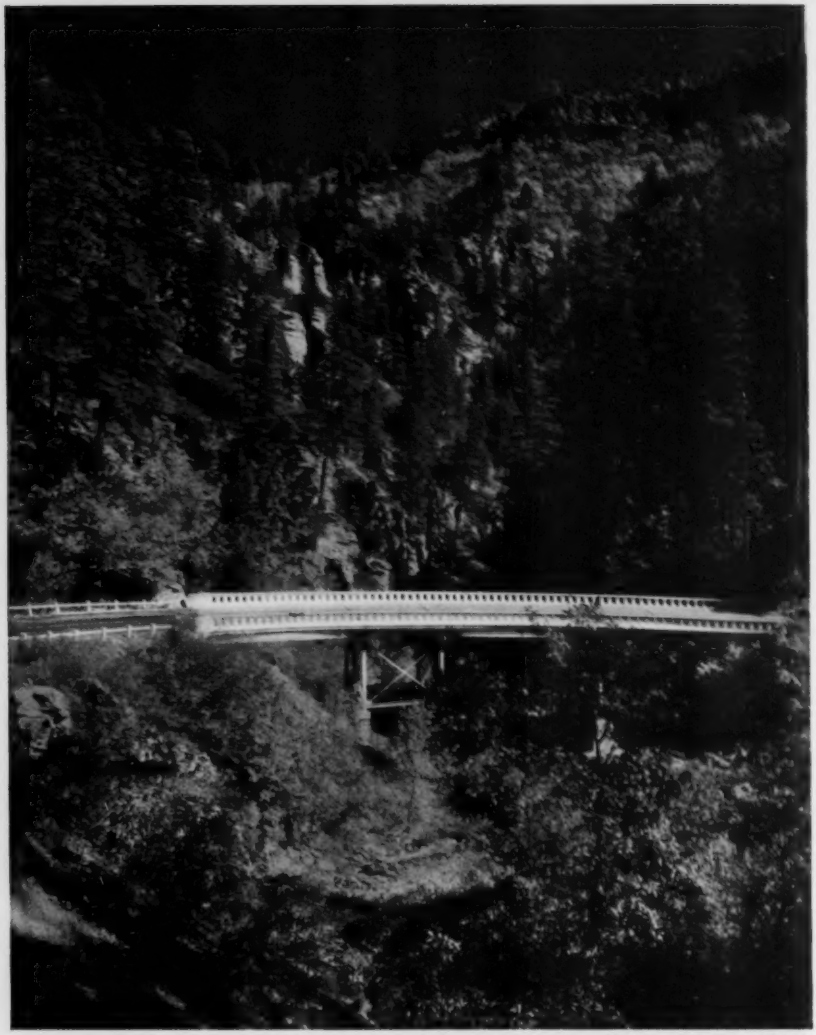


Photograph by Jerry McLain

HIGHWAYS CAN BE HAPPY WAYS, ESPECIALLY WHEN THEY PASS THROUGH SCENES AS BEAUTIFUL AS THIS PICTURED ABOVE FROM ALTERNATE U. S. ROUTE 89 BETWEEN FLAGSTAFF AND SEDONA, ARIZONA. THE BRIDGE WAS BUILT IN 1931 BY THE U. S. BUREAU OF PUBLIC ROADS. THE LENGTH IS 160 FEET WITH A 40-FOOT CENTER SPAN. LAST YEAR, 291,270 CARS PASSED OVER THE BRIDGE, AN AVERAGE DAILY TRAFFIC FIGURE OF 798 MOTOR VEHICLES OVER THIS ONE STRUCTURE IN THE SOUTHWEST'S SCENIC REGION

Our Millionth Victim

THIS is the year when someone will become the millionth victim of fatal motor accidents in the United States. This is our record for a generation—nearly three times as many killed by motor cars in the last fifty years as were killed in action in all our wars in the 175 years of our history. It is a shocking record, shocking enough to awaken a vigilant and sympathetic people.

It has not done so. It has not awakened us, though citizens have daily commented and speculated upon it, and writers have strained their vocabularies to arouse us to effective action.

These significant records, scrupulously compiled, are subject to many forms of statistical comparison. But even a cursory examination reveals many reasons for annual repetition of motor vehicle casualties and their growing seriousness.

Our repeated failures to face the problem realistically have reached a degree of indifference. And the indifference has been a national disgrace for a quarter of a century. No other problem of the same importance to our life and security has gone so long with so little correction.

These statements are made with full knowledge of minor variations over the long period of years and of those arguments based mainly on laws of chance and inevitability. So long as we leave undone those things that so obviously ought to have been done, we practice defeatism and decry the consequences.

Any approach to a solution must curtail those unnecessary accidents due to causes subject to correction. To achieve this end, definite and positive control measures should be rigidly enforced.

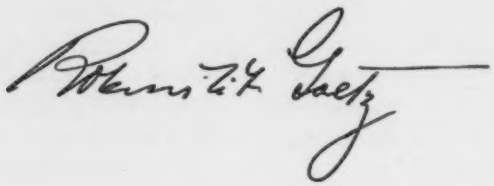
Every community has contributed to the problem. Every community has a moral obligation to correct it.

It is unthinkable that so many incompetent and dangerous drivers have been qualified and privileged to drive by official state agencies. The tendency to neglect minor offenses leads to carelessness, serious accidents and a flouting of law.

Driving a car is a serious business, but many drivers do not so regard it. On their feet they are one thing, in their cars quite another.

Any other form of industry or national activity operated on similar loose and neglectful principles would quickly founder. The initiation of corrective measures must come from higher-ups. It is their serious responsibility and moral duty.

Reasonable regulations, enforcement with sufficient emphasis on minor violations and stern judicial support will quickly bring the driving public to a sane realization of their obligations.



Truck Taxation in New York State

GEORGE T. MANNING

Mr. Manning has been a member of the New York State Legislature since 1938. In 1946 he entered the State Senate representing the 50th Senatorial District. As a legislator he has served as Chairman of the Assembly Committee on Military Affairs, Vice Chairman of the Senate Committee on Motor Vehicles and is now Chairman of the Senate Committee on Penal Institutions. He is ranking member of the Commission on Coordination of State Activities and is a member of the Senate Finance Committee as well as being Chairman of the Joint Legislative Committee on Highways, Canals and Revenues that has studied the revenue problem and recommended the subject discussed in the accompanying article.

EVERY American is familiar with the time-worn platitude, "Build a better mousetrap than your neighbor and the world will beat a path to your door." The average resident of New York State knows equally well and is justifiably proud that he lives in a state that makes a multitude of "better mousetraps." This claim is amply verified by the fact that in one recent year alone the "value added by manufacture" to raw materials in New York State amounted to over $9,636,000,000. Sadly lamented and greatly resented, however, is the result that the highway "path" to—and through—his door is being beaten literally into disintegration.

It is true that other states are facing highway problems but New York's situation is particularly acute. Not only are we incredibly dependent on highway facilities for adequate service in an industrial sense but in addition, 85 per cent of our state's 14,830,192 population lives in 15 per cent of our total land area. The problem of merely supplying that area with essential commodities is a major consideration. Our entire agricultural, business and industrial economy is predicated on the 80,000 miles of paved roads that make up our highway system; roads that carried in 1949 an estimated 30 billion miles of traffic.

This traffic volume is the second highest in the nation and greater than the total of fifteen other states. Transportation has been jocu-

larly defined as "the science of getting from one place to another sitting down" which aptly describes it in part, but its essentiality in today's life is not so easily defined or comprehended.

Changes in Highway Use

The accelerated nature of our economy has resulted in many changes in the use made of our highways. Roads built twenty or thirty years ago for traffic composed primarily of passenger and light-weight vehicles are inadequate and unsatisfactory for today's heavy commercial carriers. Consequently not only have our earlier constructed roads been ravaged by the heavy loads they now bear but it has been necessary to approach road building and design with an entirely different concept of engineering. All official studies indicate that the cost of constructing and maintaining a highway to accommodate our increasing commercial traffic is excessively greater than for a basic road that would be suitable for 90 per cent of our traffic.

Roads built for heavy vehicles, those having a gross weight over 18,000 pounds, must be thicker, wider, flatter and straighter than those used by light vehicles. A California study indicates that heavy vehicles are solely responsible for 55 per cent of total construction costs, and a Pennsylvania official stated in 1949 that the changes necessitated in material specifications alone to prevent "pumping" by heavy vehicles cost an additional $17,000 for each mile. Pennsylvania also found that roads used by heavy trucks cost fourteen times as much per mile to maintain as those used exclusively by light trucks and passenger cars.

The overall cost of ordinary highway construction per mile was 60 per cent higher in 1948 than in 1928 and the cost of maintenance and operation has doubled since 1940. Today's price tag on one modern mile of rural road, six-lane, divided in "parkway" fashion is $360,000. Four lanes, undivided, will cost $235,000 a mile and the narrow two-lane roads will cost $140,000. For urban construction $100,000 additional per mile may be added.

In 1950, the United States Bureau of Public Roads found that heavy trucks had increased on the highways by 1,400 per cent since 1935. These trucks have become faster, larger and heavier; truck

loadings having increased 205 per cent since 1936. On a typical road it was found that in 1931, 5,000 vehicles were carried including 780 trucks; in 1947 it carried 9,500 vehicles including 1,980 trucks, or an increase of 154 per cent in truck traffic.

The number of trucks per thousand weighing 30,000 pounds or more increased from 110 in 1942 to 148 in 1949; those weighing 40,000 pounds or more increased from 32 to 82 per thousand in the same period and vehicles weighing 50,000 pounds or more increased from 10 to 36 per thousand. Percentage-wise the increases respectively were 35 per cent, 160 per cent and 260 per cent.

"Use" Costs and Revenues

New York, faced with the problem of ordinary and extraordinary road construction and repair, tackled the question of assigning the extraordinary costs to vehicles receiving exceptional use benefits. With two objectives in mind—the need for a more equitable assignment of "use" costs and the need for additional revenues—New York State joined the ranks of other states desperately seeking a solution to problems varying only in degree. In 1949 the Governor's Conference accorded the subject of equalizing distribution of highway costs a prominent place on its agenda, agreeing that increased costs, unprecedented demands on highways, and Jack-and-the-Beanstalk growth of heavy vehicles were breaking down a none too adequate highway system precipitately.

Having extended a helping hand to the once-infant, now-adult trucking industry for many years, New York owed no apologies for determining to rectify the revenue imbalance under the existing tax structure wherein it ranked third lowest of all the states in its user fees on heavy vehicles. On the basis of "ton-mile" usage (a ton-mile being the unit of measure describing the movement of one ton one mile) passenger cars were paying 23 cents in taxes per one hundred ton-miles, while a 40,000 pound tractor-semitrailer was paying 5 cents for the same privilege. Besides the liberalism of New York on a tax dollar basis, the state's weight-limitations of 22,400 pounds on each axle are considerably easier on the trucking industry than the 18,000 frequently allowed and strongly advocated by the

American Association of Highway Officials. The axle load profit factor in trucking operations is not to be discarded lightly. It has been established that a 10,000 pound overload, carried on each of five weekly 300-mile trips, represents additional revenue of $12,500 annually.

Equally favoring the trucking industry, but definitely an involuntary factor on the New York State highway transportation scene, was the lack of enforcement facilities to prevent or apprehend overloading violations. In 1949 New York made 508 overloading arrests compared to 32,315 in Illinois and 15,696 in Pennsylvania. Ridiculously inadequate equipment, insufficient personnel and a disposition to relegate all responsibility for weight enforcement to one police unit instead of to all enforcement officers contributed to this situation.

Another bargain item for the trucking industry was the fact that out-of-state trucks were paying little or nothing for the use of our highways, although they received extensive use benefits and enjoyed a competitive advantage over New York State trucks by virtue of lesser expenses.

Equalization Opposed

After being favored in these respects for many years, it came as no surprise that the efforts to make truckers pay their way by assuming their share of highway revenue responsibility brought forth concerted and highly vocal resistance on the part of the trucking industry. Goaded by the organizers of some fifteen trucking organizations, who incidentally increased their membership rolls substantially after the formation of the Joint Legislative Committee on Highways, Canals and Revenues in 1949, the trucking industry cried that such equalization was "punitive," discriminatory, and would pulverize their profits, provided they made any which they asserted was doubtful.

The diversified arguments marshalled by the opposition ran the gamut of negation. "Diversion," the term used to describe New York's practice of placing highway revenues in the general fund to be disbursed where most needed, and long a highly controversial

issue, was again dusted off and hurled into the legislative arena. Officially, the Committee decided early in its studies that inasmuch as this practice was statutorily established as a fiscal policy, evaluation of its merits or demerits would not expedite the task with which the Committee was charged: to equalize existing revenues and find means of obtaining additional funds.

The opposing interest contended that imposition of a highway use tax was certain to put all but a few trucking concerns permanently out of business and the legislators were showered with facts and figures in an attempt to prove it. I.C.C. records checked on the cases cited, however, were usually at considerable variance with the figures offered in respect to number of vehicles, New York mileage, weight-types of vehicles and operating revenues. There is no doubt that failure of any trucking concern in the future will be attributed by some to the state taxes they were forced to pay, regardless of how precarious may have been the financial history of the concern. But state subsidization and elimination of the good management factor as a means of keeping marginal operators solvent seems a questionable policy and entirely unfair to other enterprises with an equally high mortality rate.

In order to incite the support of the average taxpayer, it was darkly threatened that it would be necessary to pass these taxes along to the consumer, but thorough investigation into this subject showed that they could be absorbed with very little difficulty. Other figures offered by trucking representatives purported to prove that the trucks already were paying their way and more in New York State. However, they neglected to point out that when they talked about "trucks" they were talking about *all* trucks, from the bantam weight local delivery trucks to the boxcar behemoths; and when they calculated the taxes the trucks were paying, they included *all* taxes on *all* trucks.

As was illuminatingly pointed out in a publication of the Texas Tax Journal titled "The Case of the One Per Centers," the trucking industry is trying to hide the small per cent big boxcar trucks behind all the little vehicles, in an effort to "make the tail wag the dog." "It is this small group . . . of huge, heavy trucks and combination

vehicles which is largely responsible for the high costs of highway construction and maintenance.... Their relatively small contribution to the overall costs of your Texas highway, state and local, makes it necessary for them to try to hide behind the small vehicles—all of which the big truckers generously refer to as highway users."

The Committee particularly, and other advocates of the increased taxation were also accused of abetting the railroads in their long standing contention that highway transportation enjoyed a great competitive advantage in its failure to pay its share for the highways. While there may be truth in the contention of unfair competition, the Committee was not, nor does it intend to be, concerned with the competitive aspects of the highway problem. As early as December, 1949, rumblings from the trucking organizations made it necessary to remind them at a public hearing that the Committee entertained no preconceived hypothesis nor was it prejudiced for or against any particular interest or group of interests. Accusations in this respect have been evident throughout, however, and will undoubtedly continue to be used as a substitute for factual constructive arguments against the tax.

The arguments mentioned above, in addition to the usual and inevitable threat of political retaliation, constituted the major defense or strategy of the opposition. Governor Dewey characterized the opponents to the actual legislation in the 1951 Legislature as "a powerful, highly organized lobby, devoted exclusively to the purpose of preserving this extreme preference now enjoyed by the biggest trucks. This lobby is infesting the halls of the Legislature and putting inexcusable pressure upon individual legislators at their homes.... In the nine years I have been Governor during a regular legislative session only one other lobby has equalled this one in vehemence and lack of merit."

Their efforts in this respect did considerable injustice to the average honest trucker who seems willing to assume the reasonable responsibilities that are a rightful part of his business overhead, provided they are not oppressive. As in many cases, agitation incites organization in business and it is not likely that representatives of the trucking industry will allow their membership to believe the

corrective laws are anything but lethal until several years of tax experience have proved it otherwise.

Maryland Tests Road Damage

In all of the assistance, studies, encouragement, statistics, and cooperation that were a most vital part of the work prefacing the enabling legislation, two features were of outstanding importance: the results of Maryland's road tests at La Plata and Oregon's tax experience with a weight-distance tax. The first, developed and made possible by an eleven-state effort, removed the subject of heavy vehicle damage from the realm of contention into the category of recorded fact; the second, the Oregon plan, proved that a tax plan that embodied equity was also practical and capable of administration.

Aside from the many and varied technical observations inherent in the Maryland road damage project, certain major incontrovertible conclusions were established. The test was conducted on a one-mile, two-lane section of Route 301 under the supervision of the Bureau of Public Roads, to determine the relative effect of 18,000 and 22,400 single axle loadings, and 32,000 and 44,800 tandem axle loadings on a concrete pavement. Briefly, it was found that the 22,400 axle load, which, incidentally, prevails legally in New York, caused six times as many pavement cracks as the 18,000 pound load. Tandem axle loadings of 44,800 pounds caused eleven times as many cracks as did the 32,000 pound axle load. Similarly relative effects were found in other types of highway damage from the same loadings.

It is apparent therefore that *legally* loaded trucks are causing damage and excessive costs in New York State, to say nothing of costs resulting from *illegally* loaded vehicles. In one test in this state in the summer of 1950 during which 1,062 trucks were weighed, 146 or 13.7 per cent were found to be overloaded. Such overloading is rarely an accident. Officials of every state have claimed and cited unbelievable instances of highway damage due to excessive loads and the Maryland tests have substantiated beyond doubt the logic of their assertions.

Highway Tax Inadequacies

Much of the highway tax structure's inadequacy in state government today can be traced to sacrificing common sense to convenience of administration, and a tendency therefore to simply increase the rates of existing taxes thereby increasing inherent injustices. The very principles that may make a tax somewhat difficult to administer are the same ones that make it fair.

In our analysis of current revenue methods it was found that in each instance undesirable characteristics precluded simply increasing existing rates. The tax on gasoline, easy to collect and easy to administer, is widely used and contains a limited degree of equity as an index of highway use.

In itself, however, it does not accurately show the entire degree of highway benefit because of differing vehicle performances in terms of ton miles transported per gallon of fuel. Although heavy vehicles obtain fewer miles per gallon, in ton miles the highway services received are greater than those received by passenger cars. Increased mileage taxes, using the miles traveled and ignoring the weight factor, have very little basis in today's diversified vehicle-type traffic, wherein a heavy truck receives substantially more highway benefit than does a light truck or car.

The simple expediency of merely increasing registration fees would serve to penalize the vehicle owner who traveled infrequently; and it was apparent that the weight of the vehicle alone without regard to the load it carried did not realistically reflect the weight use made of the highway.

Consideration of general gross-receipt taxes for all commercial vehicles proved that not only do they fail to reflect properly the equitable distribution of cost responsibility but that in addition they penalize the carriers of high value cargo as well as those operating with a large volume of business and a narrow margin of profit. California has experienced considerable difficulty in employing this tax, it is reported, particularly in the problem of lease operations designed to evade payment of the tax.

Inasmuch as the Committee accepted the "use" benefit theory for purposes of equity in highway revenues early in its deliberations and

further refinement of this principle into a premise that gross weight plus distance is the most satisfactory measure of use, the "ton-mile" tax which incorporates both weight and distance as indices was carefully scrutinized.

Here again definite problems were apparent, notably in the complicated aspects of administrative procedures and enforcement problems. Nine states had experimented with one form or another of ton-mile taxation and had failed. It seemed unlikely that New York, with its numerous vehicles, intricate highway system and poor record of weight enforcement could do better. The variable weight factor represented the greatest handicap and it seemed possible that a weight-distance tax, a form of ton-mile taxation having but one variable—distance (mileage)—instead of two, merited consideration as a solution.

Oregon's Tax Plan

The State of Oregon, which had been administering such a tax, afforded an interesting model for study; after fifteen years' study and experiment it was enjoying a most successful application. The benefit of their tax experience contributed extensively to New York State's favorable consideration of a similar tax. Certain dissimilarities between the two states regarding traffic volume, number of vehicles, boundaries, population density, and several other factors made a precisely parallel plan impossible but the basic issues which stood trial offered adequate and significant precedent.

Especially helpful were extensive Oregon engineering studies involving several years' work. These studies originally calculated the cost of constructing and maintaining highways for basic vehicles and then determined the additional cost necessary to provide facilities for heavier vehicles.

By pro rating these costs on the basis of mileage and weight it was possible to establish a schedule of rates wherein the greater the gross weight of the vehicle, the greater would be the tax base. Under this schedule, for instance, a 6,000 pound truck pays at the rate of 1 mill for each mile covered, while a 60,000 pound vehicle pays 22 mills for the same distance.

Each commercial vehicle in Oregon is issued a highway use per-

mit and assigned an authorized weight classification based on gross weight, defined as the combined weight of the vehicle plus the load it may carry. Penalties are provided for violating such declaration. Mileage records are kept and the tax is computed and reported monthly.

Enforcement in Oregon has not been a serious problem and police officials report that on the whole the trucking industry is cooperative. Study of transcripts of public hearings held for the benefit of trucking and related interests indicate that these interests are satisfied with the tax and advocate its continuance. Interesting also is the fact that while the optional flat rate tax is available to all vehicles up to 18,000 pounds gross weight, the trucking operators prefer in most instances to pay their taxes on the basis of actual mileage use.

Contrary to the vigorous indictment of the tax by the New York truckers that the transportation industry would be severely crippled, the trucking industry in Oregon is experiencing a healthier rate of growth than is New York. In 1949, four years after imposition of the tax, registrations in Oregon increased 7.2 per cent. This rate was higher than the national average and double the rate in New York and New Jersey.

The 1948-49 annual report of the California State Board of Equalization states, ". . . The reduction in number of licenses is attributable to the high business mortality rate of small marginal operators, many of whom entered the transportation business in the immediate postwar years. The fact that highway transportation continues to grow, as reflected in a 6.6 per cent increase in taxable gross for the fiscal year, while the number of licensees is decreasing, indicates a possible shifting of business from the marginal operators to the older, more efficient, and more securely established firms."

This situation is paralleled in several states' experiencing decreased commercial license registration and indicates a "survival of the fittest" trend in the motor transportation field as well as in other economic ventures.

Oregon collects about 18 per cent of its total highway revenues from the weight-distance tax at a collection cost of about 4.2 per cent. Seventy weighing stations are maintained at strategic points throughout the state and thirty field auditors check reports and records.

Committee studies showed that in nearly every instance in which a form of ton-mile tax had foundered, too broad coverage had been attempted. Although Oregon imposes its tax on all vehicles over 4500 pounds it was thought practical for New York to levy it on all vehicles having a gross weight of 18,000 pounds or over. Thus its administration and enforcement problems will be limited to a comparatively small group, estimated at about 10 per cent of the total commercial registrations. In doing this the optional plan used in Oregon for vehicles weighing less than 18,000 pounds was eliminated and projected legislation to increase diesel taxation from 4 to 6 cents made it unnecessary to provide a secondary rate schedule for diesel-operated vehicles.

New Gross-Weight Tax

Not a part of the weight-distance tax, but a new law changing the tax base of all commercial vehicles will require such vehicles to be taxed according to gross weight on annual registration fees, rather than on unladen weight as was previously the case. New York, until this year, was one of five remaining states using the unrealistic vehicle-weight base. Thus a truck whose vehicle, or unladen, weight is 6,000 pounds now paying $48 at 80 cents per cwt. will pay $90 computed at 50 cents per cwt., if the combined weight of the vehicle and the maximum load it will carry is 18,000 pounds.

The exemptions of certain vehicles are the same, primarily, in both the New York and Oregon laws. Farmer-owned and-operated trucks, government trucks, rural free delivery mail trucks are all exempt; and in New York all vehicles operating exclusively within a zone established by the State Public Service Commission are not required to pay the tax but must register and obtain a use permit. Operation of any vehicle outside such a zone, however, in any instance whatsoever brings the vehicle permanently within the mandate of the tax law for its entire operation.

Pressure was brought to bear by the so-called "one-way" haulers and as a result the original tax bill was amended to permit them to compute their taxes on the weight of the vehicle alone if it carried no load whatsoever. Actually, this concession is an invasion of the basic

"use" principle contained in the law, since the established rate schedule is already weighted to allow for the fact that any eligible vehicle is empty some of the time. According to figures released by the Bureau of Public Roads in 1950, light trucks are fully loaded for 36.7 per cent of their mileage, light medium trucks for 52.8 per cent; medium heavy trucks, 55.2 per cent and heavy trucks, 66.5 per cent.

However, gasoline tank trucks, milk trucks and similar "one-way haul" vehicles are as a rule loaded to 100 per cent capacity when loaded at all, and are often loaded beyond the legal limits by virtue of their cargo. Milk tank trucks, for example, must be loaded to the brim as any air space would permit a churning action, resulting in butter instead of milk. This concession was not only unfortunate on the basis of equity, but necessitates further administrative procedures and creates additional enforcement problems.

Oregon administers its weight-distance tax through the Public Utilities Commission whereas New York has put its tax in the hands of a special bureau in the Tax Department. Close cooperation between this department, the Motor Vehicle Bureau, the Department of Public Works, and the State Police must be maintained, however, if the measure is to be entirely successful.

Lack of statistical data showing New York commercial vehicle registration segregated by weight classification, and the necessity of obtaining both this information and estimated vehicle mileages by sampling procedures preclude a specifically accurate estimate of the revenue yield. But with careful administration and stringent enforcement the annual revenue yield from the combined weight-distance tax and the change over to gross weight registration, including out-of-state vehicles, should be close to thirty million dollars beyond our previous income.

The tax is not a perfect one and in New York, as in Oregon, it is inevitable that changes will be required over a period of years to carry out its intent and improve its administration. But a commendable beginning has been made and its progress will be carefully watched by those who sponsored it and other interested groups.

Nearly every impartial organization interested in state taxation has gone on record in endorsement of the truck tax program, and the tenor of individual reaction has been highly favorable almost with-

out exception. Several labor organizations have gullibly been lured into active opposition, having been persuaded that the economic impact resulting from the tax would cause unemployment; but this allegation will be found in New York, as it was in Oregon, utterly without foundation.

It is hoped that the trucking industry will not be led into an attempt to scuttle the tax law by making its administration and enforcement as difficult as possible, as such questionable strategy will be stringently resisted by the authorities concerned.

A step has been taken in New York's tax history that given half a chance should not only prove fruitful in terms of much-needed revenue but also will have monumental significance in helping to relieve property owners, private motorists, and agriculturists from a long-standing burden that has been in effect a subsidy to a relatively small group.

Where Zoning Stands Today

NORMAN WILLIAMS, JR.

Mr. Williams is acting director of the Division of Planning, Department of City Planning, New York City, and editor of Zoning and Planning Notes, The American City Magazine. For a time he was president of the Citizens' Housing and Planning Council of New York. While studying law at Yale, he served as Editor-in-Chief of the Yale Law Journal. He practiced law in private firms in New York for about five years and later was staff attorney on the Plan for Rezoning New York until he assumed his present duties last year.

AFTER thirty-five years zoning has come of age. It is entering a period of consolidation combined with new experiment. What was in 1916 a drastic step into the unknown in constitutional law has now become widely accepted, respectable—and in some danger of being regarded as a cure-all. Yet with all the widespread acceptance of and even enthusiasm for zoning, popular understanding has unhappily lagged behind.

It is essential at the start to have clearly in mind what zoning is, and is not. Zoning regulations have two principal functions: to control the use of buildings and of land; and to control the size of buildings and the location of building walls on a lot. These "use regulations" and "bulk regulations" vary in different districts of the city. Zoning is *not* concerned with the details of street layout or traffic regulations.

Through the years, zoning ordinances have undergone great change—partly from increasing experience with zoning and planning, partly from changes in technology, particularly in methods of developing land. Originally, residence, business and industry were in separate districts; and bulk regulations, often embodied in a separate set of districts, usually consisted of height regulations, yard requirements, and limitations on the minimum size of courts. That setup is far from adequate for dealing with problems today. For example, large sites including several blocks or more are increasingly

developed as a unit, and several traditional bulk regulations are only an irrelevant nuisance in these projects.

Automobile traffic, relatively a minor matter in 1916, has come almost to dominate thinking about city problems. Airports have created new problems. Industrial processes are constantly changing and the degree of objectionableness of various factories changes with them. As a result of these and many other developments, new techniques have been tried in zoning ordinances: many more use districts, a major shift of emphasis in bulk regulations, stricter control over non-conforming uses, requirements for off-street parking and loading facilities, transition zoning, airport zoning, and various other controls applying in special areas.

Faults in Zoning Ordinances

While zoning ordinances have accomplished a great deal, particularly in protecting the more expensive residential and retail areas, a number of faults have become evident through the years. First and most important, as a result of a wise initial caution far too much land has been allocated for business and industrial use and far too much residential land to huge bulky apartments. Second, the zoning maps have been too frequently amended to give special favors to individual parcels—by "spot zoning." Yet while both use and bulk regulations are in general much too loose, in certain respects they are unnecessarily rigid, sometimes practically dictating design in accordance with architectural styles of doubtful desirability. Third, several earlier kinds of regulations have become outdated through technological trends. Finally, many ordinances have grown extremely complex, primarily because of constant amendment through the years.

As a result of all this, widespread confusion has arisen as to the actual basis of zoning regulations. The only generally accepted basic principles—protection of health, safety and welfare, etc.—are so abstract as to be practically meaningless. In several instances two opposing lines of legal decisions have developed, each arguing from different premises and without any body of commonly accepted doctrine to refer to. It is therefore necessary to go back to first principles: what are the proper bases for zoning regulations?

Criteria for Use Regulations

As for use regulations, there are three primary criteria for classifying the uses of land and buildings. First, establishments needing a similar environment should naturally go together—hospitals with low-density residences, commercial hotels with department stores, open storage with heavy industry. Second, for each primary type of land use certain necessary services should be conveniently located nearby —schools near residences, banks and advertising agencies in business areas, warehouses near manufacturing plants. Finally—and most important in traditional practice—incompatible uses should be segregated from each other. Specifically, factors of incompatibility may be divided into five groups:

1. Physical danger—as from munitions dumps and paint factories
2. Traditional nuisances, in the legal sense—offensive noise, vibration, air pollution and various other wastes, heat, glare and other objectionable influences
3. Traffic, either congested or in the wrong place
4. Visual nuisances—the aesthetic factor, usually referred to by the phrase "protecting the character of the neighborhood"
5. Psychological nuisances—as fear of death or dislike of various social groups—usually included in a general reference to maintaining property values

Bulk regulations are concerned with three problems. First, such regulations control the density of development and consequently the degree of congestion in any area by restricting the overall size of permitted buildings. Second, bulk regulations assure access to light and air, and a certain degree of privacy, by controls over the height and spacing of building walls. Third, in residential areas bulk regulations provide for a certain amount of open space at ground level.

The remainder of this article will review recent trends in zoning controls in the light of the above objectives.

Trends in Zoning Controls

To start with bulk regulations, the most important trend is from rather indirect to more direct controls. In the older ordinances reliance was largely on height, yard and court regulations—all of which are really spacing controls designed to protect light and air—in the expectation that these would incidentally provide some control over the total size of buildings, and over open space. In contrast, recent ordinances are likely to contain specific provisions controlling density and open space. Among density controls, the most frequent is a requirement for a specified lot area per dwelling unit in residence districts. However, controls over the maximum floor area ratio (i.e., floor area divided by lot area), and over total cubage are being used more and more. The original (and most frequent) open space control is a negative one, restricting the percentage of lot area covered by buildings; but an affirmative requirement for *x* square feet of usable open space per dwelling unit has been increasingly invoked.

In addition, spacing controls adopted to protect light and air are themselves changing. The traditional height, yard and court regulations are quite inflexible, prescribing the exact size and shape of permitted buildings and their locations on the lot. Moreover, such regulations usually force a building into the center of the lot, making a really usable open area difficult to obtain. Finally, such provisions are not adaptable to large-scale projects. Obviously such regulations are not the only possible way to insure light and air for windows. As a result, various new techniques are now being worked out to require a specified open area between building walls in order to insure light for windows while permitting more flexible site planning.

Criteria for Residence Districts

Residence districts may be based on either of two criteria—different levels of density, or differences in occupancy and building types. Districts based upon density usually provide a range of permitted bulks—varying by floor area ratio or by lot-area-per-dwelling-unit, or indirectly by height, yard, or court regulations—appropriate for different types of areas, located generally at different distances from

employment. In such districts the dominant consideration is to limit the amount of traffic congestion, both pedestrian and vehicular, in each area, while promoting freedom of architectural design and the development of diversified neighborhoods.

However, districts may also be based on specified building types and on occupancy: 1-family detached houses, 2-family houses, sometimes 4-family houses, 1-family row houses, and so on. While popular support for such districts is often expressed in terms protecting property values, the underlying factors which are thought to affect property values are not altogether clear. In part the concern is for protecting the low-density character, quiet and open appearance of an area; in part it is based upon intangible psychological factors—preference for a high-class "exclusive" neighborhood and dislike of the classes of people who rent their homes. Frequently that is buttressed by the argument that home-owners take better care of their property and maintain its appearance—the aesthetic argument again.

Similar considerations are involved in two other types of regulation that are now being widely litigated, requirements for acreage lots and prohibitions of small homes. Acreage requirements, ranging from one to five or even ten acres, find considerable justification in protecting an open, peaceful rural atmosphere against noise, bustle and traffic; and in expensive areas such provisions are also frequently used to promote economic stratification. Minimum building size requirements are aimed directly against those unable to afford a larger home, partly because it is thought that the local taxes they pay will not cover the cost of schools and other services for their families. In a democratic society, class legislation as bald as this is generally suspect, and such provisions are usually thrown out in court.

The adaptation of bulk regulations to large-scale projects is another major current problem, significant primarily in residential zoning. Conventional yard regulations are based upon the assumption of a single building on a lot; their application to a large project often results in the preposterous situation requiring a developer to draw in fictitious lot lines around each building. While court regulations at least focus attention on the distance between building walls, the standards set by such provisions are based upon the proper distance between buildings. Since the traditional spacing regulations

obviously do not cover the problem, some cities have set up special procedures for administrative review of each large-scale project separately. While this at least avoids wasting time on irrelevancies, the implicit assumption that a large-scale development is an unusual freak is hardly realistic, and such a set-up opens the way for political pressure and favoritism. In brief, the development of simple and universal standards for spacing of buildings in large-scale projects is only just beginning.

Finally, off-street parking facilities are being increasingly required for practically all residential construction. An amendment to this effect was recently passed even in the City of New York.

Change in Business Zones

Retail and commercial districts have been undergoing equally significant changes. The original business zones, usually mapped in long ribbons along most major streets, have been widely replaced by a variety of new districts differentiated to meet the varying needs of modern retailing and often mapped in concentrated clusters.

Local shopping areas are frequently given special treatment to minimize nuisances to nearby residences and to encourage better local shopping centers. In order to protect residents, the stores permitted in such areas may be limited to those used for daily shopping, or (in high-density areas) to the type of stores normally desired within walking distance. Furniture stores and other establishments involving a lot of heavy trucking may be excluded. Non-residential development is limited to the ground floor in New York and some other cities in order to exclude warehouses, large office buildings, and other commercial buildings involving heavy traffic.

Moreover, in both these local retail districts and the larger secondary commercial centers in the outer areas of a city, the long and often largely vacant ribbons of business zoning are replaced so far as practical by regulations designed to encourage a different pattern with shopping areas clustered at convenient locations and more in line with actual needs. In part this is to encourage more convenient and thus more prosperous shopping areas; in part, to extend residential protection and so to encourage the development of the areas

between shopping centers. While business zoning has traditionally extended some 100 feet back from a major street, the depth may be increased to 150 feet or even 200 feet, to provide room for supermarkets and especially for off-street parking in areas where most of the customers come by automobile. Finally, specific zoning provisions are being developed to encourage the establishment of integrated local shopping centers.

Turning to areas wholly devoted to commercial activity, a variety of provisions has been invoked, especially in the larger cities. First, starting in New York, specially restricted commercial districts have been established for the best retail and office areas, and particularly the famous Fifth Avenue area in midtown Manhattan, in order to exclude theatres, cabarets, open front stores, and so on. While a number of grounds have been advanced in favor of this district, actually an aesthetic regulation is involved. Second, there has been increasing differentiation in general commercial districts between the central and the outer areas. Third, concentrated amusement and amusement park areas require special treatment with no restrictions on signs.

Finally, some provision must also be made for two types of less attractive commercial areas. Filling stations, automotive and other repair services, building material yards, and other necessary local service establishments involving considerable nuisance generally tend to concentrate in clusters in the vicinity of residential areas. A different problem is presented by the blighted areas where residence, commerce and manufacture are usually all mixed up together. In this instance, probably the most realistic course is to recognize that the solution for such areas must come through large-scale redevelopment, not through small-scale development under the guidance of zoning. While the nuisance services mentioned above are legitimate uses for which some space must be provided, the blighted areas may be handled by some interim zoning pending redevelopment.

Although manufacturing districts have been increasingly differentiated, the major problem in industrial zoning lies in a reexamination of the whole basis of classification. Conventionally, the regulations for each such district set forth long lists of permitted (or prohibited) industrial establishments, classified generally according to the

amount of nuisance likely to result from each. This system of zoning regulations implicitly assumes that the amount of nuisance produced is fairly constant for all establishments using the same industrial process, and for any process over a considerable period of time. Since engineering advance has made it possible to eliminate nuisances from almost any process and since technology is not static but the most dynamic thing in the world, the conventional system of regulations is unsatisfactory. Increasing attention is therefore being given to the possibility of developing a system of industrial zoning districts, based upon actual measurement of the nuisances produced—decibels of sound, the degree of air pollution, and so on. According to substantial engineering opinion, such a set-up is potentially practical in the near future. Various technical problems remain to be solved—where the measurement should be taken, special wind currents, etc.

New residential construction is now prohibited in industrial areas in about half of the major cities, partly to prevent residences in an area filled with unhealthy nuisances and dangerous heavy trucking traffic, and partly to prevent scattered residential development from breaking up large industrial sites.

Control of Non-conforming Uses

Turning to regulations that apply through a series of districts, increasingly strict controls are being invoked against non-conforming uses. Expansion and structural alterations are generally forbidden or severely restricted; and if operations are discontinued or a building is destroyed, the non-conforming use usually cannot be revived. All such regulations represent a conscious policy of hampering non-conforming uses in the hope of gradually forcing a reversion to conforming uses. Moreover, in a considerable number of recent ordinances, non-conforming industrial and even commercial uses in residence districts, are required to terminate after a reasonable period of amortization.

The effect of excessive parking and of unloading at the curb on traffic congestion in city streets is all too well known. The seriousness of the situation has brought about a complete reversal in the attitude toward off-street parking and loading facilities; instead of being

widely forbidden, they are now widely required. Originally, garages were generally regarded as something half-way between a munitions dump and a manure pile, partly because many were in fact converted stables in which the aroma tended to linger on. Such establishments were accordingly permitted only in manufacturing districts. But as the traffic problem has grown worse and worse, an increasing number of cities have permitted garages, required accessory parking facilities in commercial areas, and have also required accessory facilities in residential areas. However, such facilities are often made subject to a variety of controls to minimize nuisances, both physical and visual, and to prevent interference with traffic near street intersections.

Requirements for accessory off-street loading facilities are also increasing. Besides requiring much less room than is needed for parking, these facilities may in some respects offer a greater opportunity for relieving traffic congestion. As a rule, factories need more loading berths than retail establishments and the latter need more than offices, hotels, and hospitals. In general, too, larger buildings need *proportionally* fewer than smaller buildings, because with each additional berth there is an increased likelihood that any one berth will not be in use at any given time. Since the space required is relatively small, berths are frequently installed in existing buildings; and it may be possible to require such installations in buildings with sufficient frontage. In crowded commercial and manufacturing areas, this would probably do more to relieve traffic congestion than any other single step.

In addition to regulations varying by district, zoning ordinances often contain regulations that apply in special areas whose boundaries do not coincide with the boundaries of the zoning districts. For example, in an attempt to moderate the sharp change along district boundaries, certain regulations of the more restrictive district may be applied for a specified distance within the less restrictive district, or vice versa. The most frequent (if the least important) of such "transition zoning" regulations provide that residential front yard requirements should be continued across a district boundary to apply to business frontage along the same street (usually a side street). Other provisions restrict business entrances, show windows, and signs located in a business district but near a residence district. Ob-

jectionable industrial uses may also be forbidden within a specified distance of residence districts, in direct contrast to a frequent—and rather astonishing— earlier practice of increasing the permitted residential density in the vicinity of industrial areas.

Another set of regulations applies within a specified distance from certain types of establishments. Most common is prohibition of garages near schools and other community facilities, in the interest of greater safety for school children. Equally important are regulations restricting the height of buildings in the immediate vicinity of airports, in order to prevent buildings from projecting up into the flight paths both for the safety of air passengers and of building occupants. Likewise, in larger cities there is often considerable demand to protect small parks by preventing tall towers from overshadowing them.

Even though the effect of zoning ordinances is generally only felt over a long period, such laws remain one of the basic influences in determining the future of our civilization. For zoning is concerned with nothing less than the health, safety and physical environment of the future population. Any such system of legal regulation can be really successful only when there is widespread public understanding of what is being done.

The New Jersey Turnpike

PAUL L. TROAST

Mr. Troast, one of the founders and first president of the Mahoney-Troast Construction Company of Passaic, N.J. and Philadelphia, has been Chairman of the New Jersey Turnpike Authority since March, 1949, when he and two other Commissioners were appointed by Governor Driscoll to undertake the job of building the 118-mile New Jersey Turnpike. He also is a director of the Passaic National Bank and Trust Company, and of other business organizations. He served as treasurer of the City of Passaic, treasurer of the Passaic Valley Water Commission, a delegate to the Republican National Convention at Philadelphia and chairman of the Passaic County Republican Finance Committee. He is a trustee of Bucknell University.

THE New Jersey Turnpike now under construction—an important project for New Jersey—will make a substantial contribution to the free movement of vehicular traffic in the entire eastern area of the country. This new express highway is scheduled to open to traffic in November of this year.

Spanning New Jersey in a north-south direction, this backbone road will connect, through seventeen traffic interchanges, with leading east-west public highways. Thus it will serve the entire state. It will be a major factor in influencing New Jersey's future growth and development.

Of greatest importance, however, the Turnpike will offer substantial relief from the congestion and overloading on the state's leading public highways. Such overloading is a problem peculiar not only to New Jersey but to other states as well. The need to provide adequate highway transportation for the steadily mounting and record number of vehicles coming into use on the nation's highways is imposing financial and economic problems for many states today.

The dearth of adequate highways stems generally from three factors; namely, (1) the inability of the states to carry out normal highway construction during World War II when the use of materials was restricted and manpower was short; (2) the conven-

tional means of financing vitally needed roads by bond issues or increased taxes is not politically practicable in view of the attitude of the voting public and, (3) the record rise in vehicular traffic since the end of World War II.

New Jersey's need for the immediate construction of the Turnpike is based on these conditions and on the fact that the state, being a "corridor" for interstate traffic, has a vehicular problem without parallel in the United States. New Jersey ranks forty-fifth in area, is second in density of population, and is sixth as an industrial producer. It lies in the center of a group of northeastern states which contain 24 percent of the population and 35 percent of the industry of the entire country. It is situated between New York and Pennsylvania with the first and second largest populations, and between the two great seaports of New York City and Philadelphia with the first and third largest populations in the country.

All highway traffic between these two states as well as traffic to New York City from the south and west, and practically all highway traffic from eastern New York and New England passes through New Jersey. New Jersey's vehicular traffic has increased sharply in recent years and its public highways are required to carry a greater volume than they were designed for; in some cases more than double the number of vehicles per day which would be considered reasonable capacity.

Sharp Increase in Traffic

What the increase in traffic has amounted to in recent years may be seen from these figures; on Route 1 in Newark, an area of congestion for many years, the increase in traffic has amounted to 43 percent from the beginning of 1947 to mid-year 1950—a period of two and a half years. Across the Washington Bridge it has increased by a similar percentage; through the Lincoln Tunnel it has risen by 36 percent; at the Pennsville Ferry by 40 percent; over the Camden Bridge at Philadelphia by 28 percent and over the Edison Bridge, in New Brunswick by 24 percent.

This highway congestion impedes the free flow of vehicular traffic, increasing transportation costs and resulting in uneconomic

operation. It also adversely affects the entire northeastern section of the United States.

The fact is that traffic in New Jersey has outgrown the financial ability of the State to provide adequate highways for it, and the only alternative for prompt and substantial relief is the construction of the Turnpike with private risk capital, and without burden on the taxpayer.

On the basis of present finances available to the state for new road construction—approximately $25,000,000 annually—it would require many years before the roads urgently needed could be constructed. This is demonstrated by a study made by the state in 1946 which showed that the minimum highway construction needed to provide for the then existing traffic would require an immediate program for $600,000,000, the equal of at least a 20-year backlog of urgently needed highways. At the time that study was made several plans were developed to finance it involving: (1) an increase in the gasoline tax; (2) a bond issue, or (3) a combination of both. None of these plans met with popular approval, however, and they were abandoned.

Faced with this situation, Governor Driscoll presented to a special session of the Legislature a proposal to create the New Jersey Turnpike Authority "to facilitate vehicular traffic in the State of New Jersey by providing for the construction, maintenance, repair and operation of turnpike projects * * * and to issue turnpike revenue bonds of the Authority, payable solely from tolls, other revenues, and proceeds of such bonds to finance such projects." This legislation, "The New Jersey Turnpike Act of 1948," was passed and became a law in October of that year.

Without Cost to the Taxpayer

Thus there was provided the instrument to provide cooperation between private capital and the government. The state supplied the Turnpike Authority and Governor Driscoll appointed three able Commissioners, who serve without compensation, to administer it. Private capital supplies the skill, resourcefulness, efficiency and money to construct and operate the Turnpike. No taxpayers' money,

whatever, is used in the project. And neither the faith nor the credit of the state or any of its political subdivisions is pledged in the financing. The highway, itself, is not even pledged. The sole security the bondholders have is the excess of tolls and revenues over those required to operate and maintain the project.

When the bondholders have been repaid in full, with reasonable interest out of tolls and revenues paid by its users, the Turnpike will become the property of the state without cost to the taxpayer. To construct such a necessary highway in the normal manner by the state would take many years while other highway needs in the state would remain unserved. By financing the Turnpike with private risk capital, the state will be able to use its normal and limited highway funds more effectively in other areas where construction is urgently needed to serve the public.

Almost from the dates of their appointments the Commissioners studied methods to finance the Turnpike's construction and the problem became realistic when the preliminary engineering reports were completed in September, 1949, showing that the project was economically sound. The sale of bonds to the public, banks and trust companies, insurance companies and, in fact every source of capital funds, was fully explored. The objective was to find not only some means of financing this vast project but to select a plan which would provide the best possible terms.

Representative bond houses reviewed the preliminary engineering, traffic and revenue reports of the engineers and, in discussions with the Commissioners, stated that in order to provide for the reserves and financing costs usual in public borrowings of this kind, it would probably prove necessary to increase the issuance of bonds from $230,000,000, estimated as the cost in preliminary reports, to a total amount between $242,000,000 and $245,000,000, depending on market conditions at the time the bonds might be offered for sale.

The Authority then studied the possibilities of financing on a "forward commitment" basis which would enable it to obtain commitments for its total financing requirements, provide for the issuance of bonds and payment of interest thereon as construction progressed and the needs for funds actually arose, and for the pay-

ment of a nominal standby fee on the balance of the Authority's total requirements.

Financing the Turnpike

A definite financing plan based on "forward commitments" was developed by the Commissioners and negotiations concluded with a broad list of institutional investors so that, before the close of 1949, the Authority had obtained satisfactory assurances within the framework of the "forward commitment" plan covering its financing requirements.

Under the "commitment" plan the bond issue was reduced to $220,000,000, or at least $22,000,000 less than it was estimated would be required were the financing to be effected through the normal channels of public distribution. The plan involved commitments from a group of 52 institutional investors, most of them insurance companies, for the full amount of $220,000,000, at a nominal fee of ½ of 1 percent annually.

As funds are needed for construction the Authority draws against these commitments, issuing its definitive bonds therefor and paying the standby fee on the unused commitment. These 35-year bonds bear interest of 3¼ percent annually. To a recent date the Authority had drawn against the commitments for a total of $105,000,000.

The first call privilege on the bonds for the purpose of refunding or redemption as a whole is ten years after the date of issuance (January 1, 1950) or seven or eight years after the Turnpike begins operation. Such redemption would be effected initially at a premium of 3 percent and at reduced premiums thereafter until 1975 when the bonds become callable for any purpose without premium. The bonds are redeemable from earnings at any time after their issuance, without premium, through operations of the sinking fund.

The Commissioners are confident that the "commitment" plan provides the best financing terms available for a project of this type and magnitude and that it establishes a new means of achieving large scale construction for the public benefit which may well set a pattern for comparable future undertakings in New Jersey and other states. Actually under the "commitment" plan it is estimated that the Authority will save upwards of $12,000,000 in interest and other

financing costs during the period of construction, and a larger sum over the life of the bonds.

With the financing available for the entire project, the Authority can fulfil its function of providing motorists and truckers with an urgently needed highway in the shortest space of time. This has been demonstrated by what the Authority has accomplished to date and what it hopes to accomplish when the Turnpike is opened to traffic on November 15 of this year.

During that relatively short period of 31½ months, the Authority will have completed all of its problems of organization, preliminary engineering surveys, the testing of the constitutionality of the Turnpike Act, the disposition of suits by municipalities, the financing of the project, the complete engineering and design, the acquisition of right-of-way consisting of more than 3,500 parcels of real estate and the opening to traffic of 118 miles of highway, including 263 structures of which five are major bridges, 194 are railroad and highway crossings, 38 are culverts and the remainder minor stream crossings. For the state to undertake construction of a project of this size in the normal manner would require an estimated 35 to 50 years, with piecemeal openings of sections extended over that period because of lack of state funds.

A Backbone Road to Serve Entire State

Actually, New Jersey's new Turnpike is being constructed to provide an immediate need for a backbone road to serve the entire state and to relieve the intolerable congestion and overloading on many of its principal public highways. This widespread congestion has been impossible of elimination in any feasible manner under the normal state program. And authorities agree that the building of the Turnpike, under the present state financial program, with usual highway funds, would be impossible of practical accomplishment.

For the state to construct the Turnpike by using all of the funds available to it for new highways, approximately $25,000,000 annually, it would require from ten to twelve years and, in that event, there would be no new construction elsewhere in the state—something which could not be condoned in view of today's intolerable congestion.

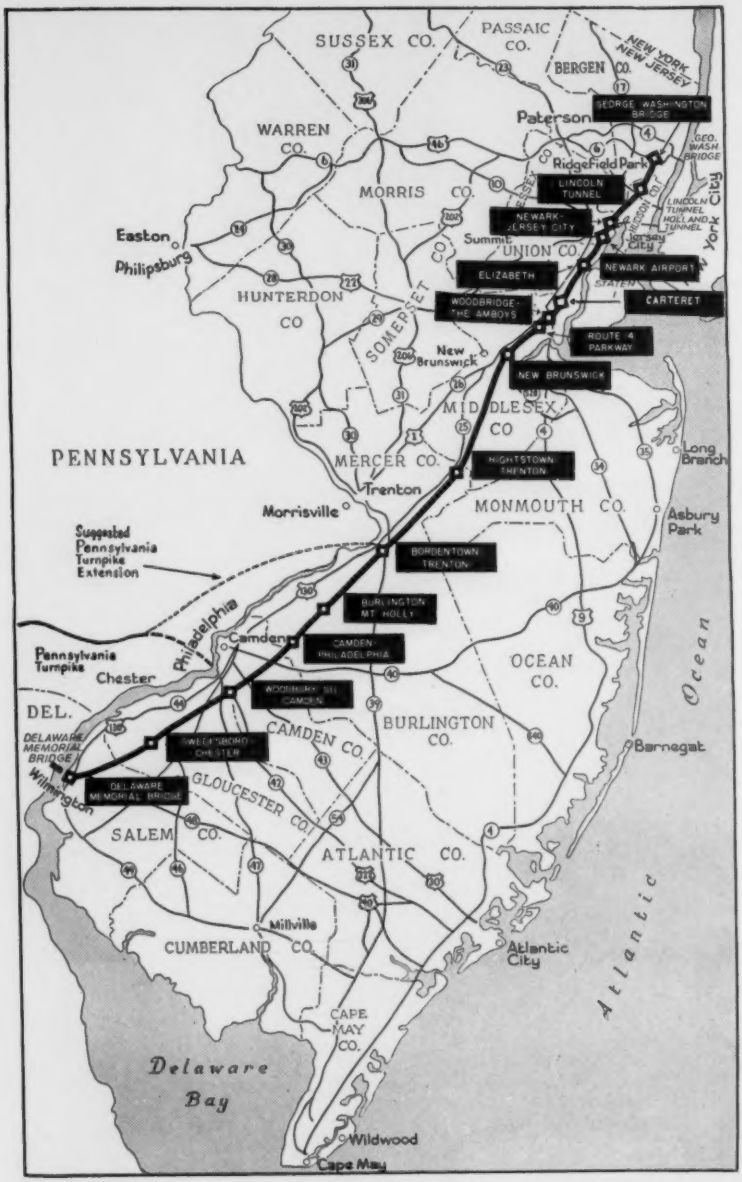
Another obstacle in the way of building urgently needed public highways is the reluctance of the public to authorize new bond issues to pay for them. Moreover, it has been politically impracticable to increase gasoline and other taxes to pay for them, leaving the only alternative of turnpike construction with private risk capital.

The major part of the work being accomplished on the Turnpike is being done by conventional methods. In the marsh areas, particularly in the northeastern part of the state where such areas are the only ones economically feasible for the Turnpike location, a comparatively recent but highly successful and fully proved method of construction has been adopted. It consists of the installation of sand drains which act as relief passages for the water contained in the unstable muds when they are consolidated by pressure from embankment fills. This removal of water from this unstable mud results in a degree of compaction that will provide a firm support for the new superimposed embankment which will be essentially unyielding and will afford foundation for a smooth roadway riding surface with minimum maintenance costs.

Construction operations, particularly grading, have been under way on practically all of the 114½ miles of Turnpike being built on earth fill. The speed with which work has been progressing is indicated by the fact that in the short period of thirteen months to March 31, 1951, grading for the Turnpike was more than 70 percent completed. More than 82 of the 118 miles are at, or near, the stage where pavement work can be undertaken. Practically all of the structures are under way with many completed to the stage where steel work is being erected, including the major bridge crossings of the Hackensack and Passaic Rivers in the north.

Perhaps one of the most difficult decisions to be made, and the one most awaited by the engineering profession and the public, was the selection of the type of pavement. The Authority initiated its study of pavement by appointing a committee with a major representative from each of its eight firms of consulting engineers. The Committee was instructed to prepare designs, comparable from the performance point of view, for both the rigid type Portland cement concrete pavement and for the flexible type asphaltic concrete pavement.

Passaic River Bridge


SUSSEX CO.
PASSAIC CO.
BERGEN CO.
NEW YORK
NEW JERSEY
GEORGE WASHINGTON BRIDGE
Paterson
GEO. WASH. BRIDGE
WARREN CO.
Ridgefield Park
LINCOLN TUNNEL
MORRIS CO.
NEWARK-JERSEY CITY
LINCOLN TUNNEL HOLLAND TUNNEL
New York City
Jersey City
Easton
Phillipsburg
Summit
UNION CO.
ELIZABETH
NEWARK AIRPORT
HUNTERDON CO
SOMERSET CO.
WOODBRIDGE-THE AMBOYS
CARTERET
ROUTE 4 PARKWAY
New Brunswick
NEW BRUNSWICK
MIDDLESEX CO
PENNSYLVANIA
MERCER CO.
HIGHTSTOWN-TRENTON
Long Branch
Trenton
Morrisville
MONMOUTH CO.
Asbury Park
Suggested Pennsylvania Turnpike Extension
BORDENTOWN-TRENTON
BURLINGTON-MT. HOLLY
Philadelphia
Camden
CAMDEN-PHILADELPHIA
Pennsylvania Turnpike
Chester
OCEAN CO.
WOODBURY-SO. CAMDEN
DEL.
BURLINGTON CO.
CAMDEN CO.
Atlantic Ocean
DELAWARE MEMORIAL BRIDGE
SWEDESBORO-CHESTER
Barnegat
Wilmington
DELAWARE MEMORIAL BRIDGE
GLOUCESTER CO.
SALEM CO.
ATLANTIC CO.
Millville
CUMBERLAND CO.
Atlantic City
CAPE MAY CO.
Delaware Bay
Wildwood
Cape May

Their instructions were to design the best possible road; (1) to incorporate all known safety features available in any type of highway in all kinds of weather and at high speeds; (2) to produce the finest in the way of non-skid surface and (3) to withstand the heaviest of loads and to provide a substantial margin of safety above such loads. Costs were to be computed over the 35-year period of the bond issue, the road to be in excellent condition at the conclusion of that period.

Upon the recommendation of this Special Paving Committee, concurred in by the Consulting Engineer and the Authority's Chief Engineer, two designs comparable in all basic essentials were developed, one of the Portland cement concrete and the other of asphaltic concrete. The Authority concluded to solicit alternate bids and these showed a difference of $5,259,229 in favor of asphaltic concrete which amount would double by reason of interest charges over the life of the bonds.

Choosing Asphaltic Concrete

The Special Committee's analysis of maintenance costs of the asphaltic concrete over the 35-year period indicated that, in spite of their being greater than for Portland cement concrete, the selection of the former would still represent a net saving of several million dollars. Because of this and the fact that experience shows that a safe, non-skid and durable pavement of asphaltic concrete could be placed and that Portland cement, reinforcing steel, steel dowels, and sleeves were becoming increasingly in short supply due to world conditions, the Authority adopted the asphaltic concrete and, accordingly, awarded contracts for the full 118 miles.

This new Turnpike (see the accompanying map) will be a divided highway without grade crossings. Its sight distances will be long and curves will be easy. There will be no red lights and no left turns for its entire distance. It will be a controlled access highway throughout with seventeen traffic interchanges as follows:

Delaware Memorial Bridge (U.S. Route 130)
Swedesboro-Chester (U.S. Route 322)
Woodbury-South Camden (State Route 42)

Camden-Philadelphia (State Route S-41)
Burlington-Mt. Holly
Bordentown-Trenton (U.S. Route 206)
Hightstown-Trenton (State Route 33)
New Brunswick (State Route S-28)
Route 4 Parkway
Woodbridge-The Amboys (State Route 35)
Carteret
Elizabeth
Newark Airport
Newark-Jersey City (U.S. Route No. 1)
Lincoln Tunnel (State Route 3)
Secaucus
George Washington Bridge (U.S. Route 46)

Initially, the Turnpike will have six lanes, three in each direction, in the twenty-two mile section from Route 35 interchange, near Woodbridge, to Route 3 interchange leading to the Lincoln Tunnel. Other sections will have four lanes initially, two in each direction. These initial lanes, it is anticipated, will be adequate to accommodate all projected traffic for a number of years.

Plans provide, however, for ultimately increasing the section from Route 35 interchange to Route 3 interchange, to eight lanes (dual-dual), and the fifty-seven mile section from the Camden-Philadelphia interchange to Route 35 interchange, and the five mile section from Route 3 to Route 6 interchange, to six lanes. For the thirty-four mile section from Deepwater to the Camden-Philadelphia interchange the ultimate number is established at four lanes. Provision is made in the design of bridge structures to accommodate the additional lanes.

The Turnpike travel lanes will be twelve feet in width, with those in each direction being flanked by sixteen-foot shoulders on the outside, of which ten feet will be stabilized, and by a five-foot stabilized shoulder on the inside.

Acceleration and deceleration lanes of 1,200 feet in length will be provided at service and interchange areas, and the median strip will range from 20 feet wide in the north, including the inside shoulders, to 26 feet wide in the south.

As of March 31, last, the Authority had awarded a total of 74 major and 35 miscellaneous contracts involving $183,309,805 for grading, drainage, substructures, superstructures, paving, utilities and buildings.

Overall, the construction work is progressing satisfactorily and the Commissioners look forward with confidence to the opening of this new facility on November 15, 1951.

Highway Traffic in Civil Defense

T. M. MATSON

Director, Yale Bureau of Highway Traffic

Mr. Matson is Director of the Bureau of Highway Traffic at Yale University and a member of the Board of Consultants of the Eno Foundation. He took part in the early traffic studies for San Francisco, Los Angeles, Kansas City and New York. He was formerly traffic engineer for the city of Philadelphia. He is a member of the Institute of Traffic Engineers, of the Highway Research Board, of the American Society of Municipal Engineers, and of the American Public Works Association.

IN THIS age of long range air transport and atomic fission, national leaders tell us we are no longer free from the danger of sudden enemy attack on our cities. Such an aerial attack, hurled against large population centers to destroy our production processes, demands civil defense because no existing military defense can guarantee full protection.

Civil defense, like charity, begins at home. The individual, his family, his neighbors, his community, may look to state and national agencies for guidance and for co-ordination with neighboring communities in a plan of mutual aid; but it is the local community, the city itself, which will bear not only the brunt of attack but also the major burden of repair and restitution. The local community, then, must depend of necessity on its own resources, skills, and efforts.

Transportation Values in Civil Defense

In the event of enemy aerial attack or sabotage on our production centers or other urban areas, what significance must be attached to highway traffic flow? What may be expected to happen on the street and highway system? Can any plans be made to achieve safe and expeditious traffic movement? What principles may be followed and what steps taken to make highway transportation function efficiently under such circumstances? How will transportation policies and procedures be decided and by whom?

It is recognized at the outset that transportation is vital in winning a war. Adequate transport of people and goods is essential not only in civil and military defense but also in keeping production going from day to day. Since the enemy objective is to destroy production—as important in modern warfare as the battlefield—as well as individual morale, every effort must be made to maintain transportation of supplies as well as that required for protection. If transportation fails, enemy objectives will be achieved.

Unique Importance of Highway Transport

While rail, air, and frequently water-ways are among transportation resources found in most cities, none of these occupy the place of importance ascribed to highway transport. The road net and the motor vehicle form a system of transport ideally suited to local, short-haul movements. In combination, autos, trucks, and streets form a transport system of infinite flexibility that reaches into each home, mill, office, and store at any hour of the day or night.

These vehicles and the street system, as well as their operating personnel, are all local transportation resources, managed by local firms and citizens responsive to local needs. Rail and air transport are suited to longer hauls, have broader state and national responsibilities and are managed accordingly; but the lines of control in most highway transport are usually found within the community. Highway forms of transportation are therefore highly significant in civil defense systems, not only because of their intimate relation with the community but also because of their inherent characteristics of flexibility and adaptability.

Under attack, damage to highway and motor vehicle resources is to be expected. Bridges may be lost, fallen rubble will clog many streets. Street cars and trolley buses, through generating and substation as well as line losses, will be disabled. Some motor vehicles may be destroyed or contaminated. Just *how much* and *where* damage to the highway transportation plant occurred will be a matter demanding early and reliable reconnaissance and interpretation, coupled with quick and certain communication to headquarters where transport decisions will be made.

Upon warning, during and after an attack, the question of individual conduct arises. At present it is pure conjecture as to how many of our citizens will get into their cars and "take to the road." Because of fear, daily habit, and unusual circumstances, many will naturally have an impulse to get in the car and proceed without delay. If panic breaks out, traffic movement where it does occur will be extremely fraught with danger and accident, or the streets will become so clogged that vehicles cannot move. It is next to impossible to envision the outbreak of such panic. It may be likened to a number of football stadia all about the area, disgorging their crowds at the same time. Under such circumstances, it is well known how a single stalled vehicle, or accident, can block movement completely on arteries of high capacity.

Every effort therefore must be made to prevent and control such hysteria. Properly organized civilian defense will perhaps avoid panic by education and the early assignment of responsibilities. Experience elsewhere seems to teach that the individual is quick to take up responsibility when it is expected of him. If necessary, blockade of minor streets must be created by placing substantial barriers across the streets. Only heavy masses will physically stop the hysterical, high-speed lunatic in his auto. Simple barricades would quickly become worthless. Strategic blocking of minor streets may be found necessary to prevent traffic "floods" in the major arteries. Such blocking however is not only a tactical device but has its strategic implications. It must be done in accordance with a well developed plan of circulation.

Transportation Requires Staff Work

Assuming a strong C. D. council has been well staffed and organized, with clear objectives and procedures, how will it deal with transportation matters? Undoubtedly the proper administration of transportation in civil defense requires a special branch at the top staff level. The planning, organization, staffing, deputization, co-ordination, reporting and budgeting functions of transportation resources must be carried out in close harmony with the chief executive as well as other branches of civil defense work.

Determination of objectives and procedures first calls for a leader having transportation skills and know-how. He will need men who are competent and compatible to deal with transport problems. The form of organization will require administrative judgment of high order. Assigning diverse phases of operation to proper men and coordinating all phases of the work in time and space relationships are prerequisites for harmonious and effective action. Finally, the need for reporting to higher authority and intelligent budgeting of resources is obvious.

Dependence on Communication

Management of highway transportation and traffic demands above all else a quick, dependable and efficient system of communication along routes and in terminal areas extending out into the entire field of work. The manner in which transportation intelligence is originated, transmitted, received, analyzed and interpreted will strongly affect the efficient use of our local transport resources. Because transportation work by its very nature becomes far-flung over the road net, every precaution must be taken by management to provide for simplicity, direct responsibility, and practicability of organization in its lines of authority. Good team work will require a good system of communication, and the plans of organization must be large enough to cover all areas that may be called upon.

Routes, Vehicles and Traffic Control

Clear distinction must be made throughout between routes and vehicles. Those functions pertaining to maintenance and regulation of route and those relating to the vehicle and its operation are distinctly different. Each demands peculiar requirements and experience for satisfactory management. Public works agencies and traffic engineering departments are admirably organized and fitted for maintenance of way and traffic control work, whereas fleet operators and their traffic managers are by experience suited to develop maximum efficiency of vehicle use.

Elements of Evaluation

Four basic considerations must be constantly reviewed and evaluated in transportation by staff agency. Every movement involves the following:

1. What and who is to be moved, what freight? what passengers?
2. How much is to be moved?
3. What is the origin and what is the destination?
4. When and with what urgency may it be moved?

These questions will be constantly before diverse branches of civil defense for estimate and answer. Collectively, answers to these questions form the basis of routing and dispatch, and will affect every detail of operation. Freight movement is distinct from passenger. The types of vehicles assigned must fit the *type of load.* Tankers are fine for liquids but valueless for bulk goods or passengers. The size and number of vehicles assigned or reserved will be dictated by the *quantity of movement.* Where stock piles are made, where collection centers are established, where damage occurs, are factors that determine *route of shipment as well as its origin and destination.*

Intelligent decisions must also be made so that shipment is made *when needed.* It is of little value to send shovels and small tools for debris-clearance that will truly be needed later, at a time when the same vehicles and drivers should be moving urgently needed food or clothing. Timing and scheduling of shipment is a fundamental factor in planning and requires sure and rapid communication.

Co-ordination

After intelligent, timely staff decisions are made as to what, how much, where and when shipment is needed, good use of transportation resources requires careful allocation of vehicles and their drivers to suit these decisions. Intelligent traffic control, through careful routing and scheduling procedures, will make efficient use of available routes and terminal areas. It is clear too that close co-ordination must be achieved between the traffic requirements of these vehicle

movements and the opening and maintenance of routes by the maintenance of way gangs. A minor bridge repair that will bring in many blocks of good route may well take priority over debris or rubble clearance of a particular block. Obviously, closest liaison and understanding must prevail at all times between transportation personnel and the engineer and public works groups.

Planning

Pre-attack planning as well as executing plans after attack will require traffic engineering skill of a high order. It is evident that no single traffic control plan will suffice. When, where, and how traffic is to be guided and controlled through speed, stop, turning, one-way, parking, and intersection control measures should not be left to improvisation, or considered a last minute detail of civil defense. Moreover, a plan best suited to a particular attack must recognize only the location and extent of such single attack.

Probably from the viewpoint of all branches of civil defense it is advisable to arbitrarily divide the metropolitan area into a grid system of co-ordinates so that the exact location and extent of damage can be readily described through early reconnaissance. Thus a prepared plan that is well suited to heavy destruction in zone A-10 may not be suited at all to an attack centered on zone C-4. It follows then that a series of plans are needed so that for a given attack every member of the civil defense organization will quickly understand which particular plan will be put into effect and will be able to go quickly about the details of execution.

This hypothesis requires a thorough and complete system of routes, well marked by signs so as to cover all sections of the region. Thus, if a main highway is lost in a limited section, its detour can be instantly designated, and with minor postings at beginning and end of detour the complete route is ready for service. So intensive must be this system of routes that nearly every zone will be crossed in one, if not two directions by pre-designated routes. Routing is fundamental to the preparation of circulation plans since routing affects every traffic movement, and pre-marking or publishing of a basic system of such routes will be indispensable to traffic control.

Analysis of diverse hypothetical attacks with assumed outages of route (s) will disclose each plan's own unique pattern of major and minor routes. Further study will develop route capacity inadequacies so that the usual forms of traffic control will need to be applied. Thus a minor residential street, suddenly called upon to carry a major traffic burden, may require stop signs and intersection control at points ordinarily unthought of in the usual peace time traffic pattern.

Regulations

Where a minor street suddenly becomes a major route estimated to have inadequate capacity, a parallel pair of such streets may need to be made one-way. In addition to route signs, one-way arrows will need to be posted and enforced when the plan requiring it is called into existence because of an attack. The one-way rule, it is well known, will greatly increase the capacity of, and simplify, the operation on most streets.

In the event of attack it is obvious that some traffic movements should have priority over others. Police, fire, first-aid ambulance and other vehicles already clearly marked and given prior rights of travel in peace time will retain high order of priority. In addition, many ordinary-appearing civil defense vehicles will carry messengers, police, fire, first-aid and rescue personnel and equipment. In some cases it may be necessary to designate certain sections of routes for exclusive use of such vehicles. Approval, designation, and marking of such vehicles should be a responsibility of the transportation staff with advice from other staff principals.

General rules of priority will be determined by staff estimate and experience. To accommodate such rush movement in the field, marking of both vehicles and routes is required. Special vehicles and routes however should always be held to a minimum. It is far better to strive for freedom of movement at all places and times.

Besides routing work, other forms of traffic control will be required at places and times completely different from the normal peace-time plan. All customary forms of traffic control will be called into action through police power and must be executed hurriedly in accordance with pre-attack plans. Signs for routing, stop control,

one-way, turn control, parking, speed and even guide and warning signs will be needed in an emergency.

Each plan of circulation and control must be quickly applied on order from staff headquarters. Thus a city-wide traffic organization must have been created and equipped so that when Plan X is called for (associated with severe damage in Zone C-4) all required traffic control devices and personnel will be quickly posted and made operative. Hence Maple Street may be made quickly to carry "Route C. D. 6" traffic, one-way south-bound, with intersection control at several of its intersections, for heavy traffic in Plan X operation. Under another plan of control an entirely different set of circumstances may prevail. Through the system of block wardens, properly trained and equipped, many details of traffic routing and control can be carried out quickly and accurately when and as called for. It is clear that each pre-attack plan must be carefully worked out with skill.

In the first stages of an actual attack normal traffic will be found. This normalcy however is dependent on time and degree of public warning and the amount of individual self-control. At night, only a minimum of vehicles will be abroad. As soon as possible, transportation headquarters should learn from field reconnaissance (air and ground forces) the location and extent of damage. Estimates of the situation will indicate what plan of traffic control should then be placed quickly into effect through its chain of command and its field organization.

In every case long-distance traffic will be re-routed around the stricken area. Mobile support, if requested and furnished from adjacent areas, will be coming in from the main state and country roads. Fire, police, ambulance, and rescue work should move as freely as possible around damaged areas on open routes in accordance with the selected plan. Hysteria traffic, if it begins, will be thwarted at its source, the minor streets of residential areas. Soon engineer and utility equipment and personnel will be moving in emergency repair work. Clearly the first few hours should prevent movement to any traffic but those vehicles engaged in civil defense work.

Should military and civilian defense require blackout or brownout for security purposes, the lack of illumination will obviously affect nearly every phase of traffic movement in the field. Speeds of

movement will need to be lowered, control devices will need to be reviewed for effectiveness under these changed conditions and roadway capacities will be greatly reduced. Blackout will be another factor to complicate further an already complex situation.

Many lessons in civil defense will be taught through experience. But prior to actual attack, as much practice as possible should be gained through trial or test runs. This will give transportation and traffic groups opportunity to work with all the other groups of civil defense. While such tests are most valuable they can never teach the hard lessons of actual experience.

Liaison and Understanding Prerequisite

To maintain satisfactory highway transport conditions, the closest liaison through communications and personal contact will be required of all branches of the work. Especially important in highway transportation is the closest working relationship among traffic engineering, police, and public works personnel, especially in the higher levels of command.

The importance of all matters pertaining to central authority and intelligence of the civil defense staff must never be overlooked. Under attack, what will happen if staff headquarters are liquidated? A second line of defense should be ready; for when leadership and command are lost, all is lost. Throughout, the location and personnel of civil defense organization must be such that stand-by facilities and secondary personnel staff will be ready to serve if primary forces are lost in the attack.

Recovery and Conservation

As soon as practicable, however, return to normal work-a-day should be started for the enemy's objective is to reduce and stop if possible, the productive processes necessary to winning the war. Gradually as streets are opened, bomb craters filled, fires put out and other exigencies dealt with, attack-area-transportation plans will be modified back toward the normal traffic pattern.

Shortages in both private and public carrier vehicles, incurred through bomb and fire loss, will again require group-riding and

staggered hours so well known from World War II. The civil defense transportation staff here also will have responsibilities to guide and enforce where necessary such conservation of its mobile resources.

Begin Now

City officials today face this challenging problem of civil defense. An early and important step is selecting a director of transportation for the local civil defense staff. He will have to make estimates of the significance of highway transport and traffic flow; what may be expected in the event of attack; prepare plans to meet as nearly as possible the demands on transportation so that local highway movement will function efficiently. Above all, he will shape the policies, objectives, procedures, and program of the transportation phases of civil defense.

Traffic control, then, must begin with and be a part of the transportation staff. It will estimate civil defense transportation needs, take inventory of transportation resources, and establish lines of authority. Improvised vehicles and roads will enable light delivery trucks to become ambulances, and Bailey bridges or pontoons to span stream beds. Organizing and co-ordinating available highway maintenance, control, and transportation equipment and personnel in the light of transportation needs will shape the main features of traffic movement.

But operation of the road net and its vehicle burden will demand traffic engineering's highest skill and effort. Making estimates, devising plans, and evaluating operations as a whole will require insight and intelligence in traffic control and planning. From the passive, lethargic state of civil defense today to the idealized organization and plan for traffic control sketched here is a long distance indeed. But if our cities are subject to enemy attack, there is but one thing to do—prepare for the attack. The job is not a small one. It will require many men, the right men, for each job. It will require time, money, and effort. For if attack comes, civilians will not only have to protect themselves; they will have to keep producing the materiél of war and the means of defense for as long as it takes to achieve victory.

Des Moines Business Leaders Tackle the City's Parking Problems

N. H. NIELSON

Mr. Nielson has been Secretary of the Retail Merchants Bureau of the Des Moines Chamber of Commerce since 1923. Previously, he had served for six years as Secretary of the Retail Merchants Bureau in Fort Dodge, Iowa; had organized retail associations in New Mexico, and served as Secretary of the Retail Merchants Association in Stillwater, Oklahoma in 1910 and 1911. He was in the retail business with his father-in-law in 1908 and 1909 and previously had worked in a country store in South Dakota. Mr. Nielson served as President of the American Retail Association Executives in 1924, and as Secretary of the Associated Retailers of Iowa since its organization in 1934. The question of traffic and parking accommodations for the shopping public in Des Moines has specially concerned the Merchants Bureau since the trade area of Des Moines extends over the entire state.

MOST any citizen of almost every city will agree that the parking problem—probably the number one problem in his loop district—becomes more and more serious as time goes on, and that too few cities have done much to help the condition.

Probably never will any city completely solve the problem because it seems impossible to keep up with the increase in automobiles and trucks and to provide adequate terminal facilities for all of them. During World War II, we knew that when new cars began to roll off the production line, Des Moines would have a serious problem. We set up a Post War Planning Committee to program Des Moines' growth. One of the principal items was what must be done to prepare for the future need of parking facilities for the shopping public.

It was then that business leaders in Des Moines said, "Let's quit talking and do something about the parking problem"—and we did.

Actually we started realizing twenty-five years ago that we were going to have acute problems. That was when Iowa roads were being paved for year-around use of motor vehicles. Des Moines the capital,

only city of more than 100,000 population, and near the geographical center of the state, is the largest retail and commercial center of Iowa. There are more than a million cars and trucks in Iowa. Most of them find their way into Des Moines during the year in addition to the 70,000 cars registered in Polk County, the county including Des Moines.

To do an intelligent job in our planning, we needed facts. Therefore in our early studies we selected typical days and with qualified checkers counted all the cars coming into the city. We were able to tell where cars came from by the prefix number showing the county in Iowa. On these check days, we found cars from every one of the ninety-nine counties, fewer from the more distant counties and a great many for those near by. Further check by our retail stores disclosed that at least nine stores had charge accounts in every Iowa county, and that all of the stores with mail order business and charge accounts had customers scattered throughout the entire state.

We even went so far as to send service crews out over the state into typical cities in our trade territory. These studies revealed that people generally want to trade in Des Moines but were coming here less and less because they were more and more confused and discouraged in trying to find a suitable place to park.

Studies Show Business District Needs

While these early studies were being made, suburban shopping centers began to expand and include many lines of businesses previously not developed.

The Retail Merchants Bureau, a part of the Des Moines Chamber of Commerce, concerns itself mostly with downtown stores in the "loop"; the Chamber of Commerce as a whole interests itself in the entire city and normally engages in developing every angle of business. The Bureau developed through a study by the Chamber of Commerce staff that 25 per cent of all taxes paid in Des Moines were paid by the loop area. With these facts before us, the business interests and property owners were increasingly concerned over possible disintegration of the downtown shopping area from the standpoint of what would happen to values. They also realized that out-of-

town shoppers were attracted largely by downtown stores where stocks were complete and selections varied.

It was further realized that if Des Moines was to maintain its position as the retail center and continue to expand by attracting business from outside of Des Moines, some definite move must be made to provide additional parking facilities.

With the advice of our own business interests, plus that of technically trained engineers from outside the city, it was estimated we needed a minimum of 2,000 additional parking spaces for our shoppers in the city. At this point, the business men and the City Council decided to install parking meters, not as a solution to the parking question, but to aid in enforcement of parking and traffic regulations. The first installation consisted of 1,200 meters, later expanded to 1,700. When the meters were installed, the motoring public was promised that the surplus above actual maintenance administration of the meters would be used to acquire additional parking facilities.

There are normally two ways to provide such facilities . . . either by private operators and business interests' subsidy, or by a municipality's providing the facilities and leasing them to private interest.

It took little research to show that there was no vacant property within the radius of the downtown area that could be made available for parking. As a matter of fact, the number of private parking lots had greatly decreased during the last five years because private industry had absorbed the property. To purchase and wreck other buildings for parking meant too much investment for the number of cars that could be accommodated. And to acquire property beyond the loop did not prove satisfactory. This was illustrated by an experiment with a carefully prepared lot provided by the Retail Merchants Bureau, twelve blocks from the loop with free bus service to and from the lot.

It is generally conceded the customer wants to be as close to the business section as possible. All of this proved to our Joint Committee of the Chamber of Commerce and the Retail Merchants Bureau that the only solution was to provide a series of multiple-story buildings or ramps situated to be accessible to any part of the loop without inconvenience to the public.

Many Questions Arose

With this decision came many questions: What type of structure . . . locations . . . number . . . how to finance . . . managerial aspects. It became evident that one large unit accommodating 2,000 cars would only create additional traffic congestion at that given point rather than improve it. Yet to be of the greatest service to the shopping public, such facilities should be in the heart of the retail business section.

Taking all this into consideration, our Joint Traffic and Parking Committee concluded that we should recommend to City officials a series of parking structures at points most convenient to the buying public. We realized that it would be virtually impossible to have a series of buildings constructed to accommodate 2,000 cars at one time. Therefore our recommendation to the city was that at least two units should be built as soon as possible and located to provide the greatest amount of accommodation to the business section which is seven blocks long and four blocks wide.

Necessarily the cost of a site, its location, traffic congestions and other factors were considered. At first, we thought vacant property could be acquired to keep down the cost, but again it was realized that cheapness of the site alone should not be the governing factor. To tear down good buildings to make room for parking space did not seem logical. We even explored the idea of purchasing buildings already built that might be converted. But that too was discarded as impractical. Therefore having decided on parking buildings and on the sites most suitable, determined by previous studies regarding the flow of traffic and other factors of traffic movement, we were ready to negotiate with someone to construct such facilities or to urge the city to provide them.

We exhausted every effort to obtain private money, or someone who would build and operate the garages. But since the profit record of parking facilities in Des Moines and other cities in the past had not proved too lucrative, no one was willing to put up the money on a purely investment basis. We approached a number of insurance companies who normally are willing to finance, through a mortgage, a large percentage of new construction. But because there was no

corporation with a profit record that would justify the insurance companies' venturing such a project, we were unable to obtain the financing from that standpoint.

In some cities, business firms themselves have frequently pooled their interests and acquired parking lots. In some cases the amount subscribed was based on size and business of stores. In other towns, the plan provided free parking for customers, based on amounts of purchases. The Chamber of Commerce believed that in Des Moines parking was a responsibility of the entire city or at least the entire business area, and not of a few merchants doing business in the loop.

Owners of office buildings, professional men, banks and nearly everyone in the downtown business area had a direct responsibility in providing terminal facilities for their patrons. This seemed particularly true when we considered the large amount of taxes paid in the downtown area, as every property owner and every citizen in the city has an indirect interest. Also since traffic congestion is created by the general public, we appealed to the city on the basis that the problem was created by the public at large, and therefore it was the city's definite responsibility to solve the problem.

However, before the city could make any move in this direction, certain legislation was necessary because, in the state of Iowa, cities are limited in their power of control by state legislation enactment. Our first approach to financing was to create a benefited district to which a limited tax could be applied for construction and maintenance of parking facilities. But protests from property owners on the edge of the benefited district, and threatened injunctions on the theory that the man across the street and just outside the district would derive just as much benefit without paying a tax, prevented us from further proceeding along that line.

We then went on the basis of the entire city's assuming the responsibility through a bond issue or direct taxation. The City Council was from the start sympathetic and most receptive to our recommendations, but again before they could proceed to bond the city or apply a direct tax, it was necessary to secure additional state legislation. Two bills were introduced in the 1949 session of the legislature which, when enacted, made it possible for the city to proceed.

FIGURE 1. Cantilever type of construction with no posts or pillars, with wide aisles for the movement of cars. This also shows the gradual rise of the floors making a continuous runway.

FIGURE 2. Main structure of spiral ramp with pedestrian entrance.

FIGURE 3. A view of the entrance and exit of the spiral five level ramp. The main structure in background is 132 x 132, accommodating 350 cars.

FIGURE 4. View of glass enclosed glazed tile rest rooms, public waiting rooms, and cashier in spiral ramp.

Needed Legislation

One bill provided that when it was proved a public need and necessity for additional off-street parking, 75 per cent of the parking meter income, after the meters are paid for, must be set aside and used by the city for off-street parking only; the other 25 per cent to be used for maintenance, repair, collection and traffic regulation in the metered district. The other bill was to provide enabling legislation permitting the City Council to issue revenue bonds and provide for a one-half mill assessment on all taxable property in the city.

It should be pointed out that the half-mill may be levied by the City Council without a vote of the people if the amount of income from parking meters and income from the facilities is insufficient to retire the bonds. This half-mill levy served as security to the bond holders and made the sale of bonds much more desirable.

This needed legislation became law July 4, 1949, after which the City Council instructed the Legal Department of the City of Des Moines to take the necessary steps to insure one or more parking ramps or garages in Des Moines. Hearings were held to prove the need as public convenience and necessity, which was the first requirement according to the law enacted.

The committee felt that the municipality should provide off-street parking for the following reasons:

1. Obtain most desirable locations
2. Use of parking meter money to help finance
3. Low cost of financing
4. No real estate taxes
5. Rate of charges at a minimum

The next step was for the city to determine the number of units that should be built in this initial program. It was decided to begin with two units and the city selected sites recommended by our Joint Committee from information acquired by the study of engineers hired for that purpose. Architects were instructed to draw plans and specifications while the city legal department was instructed to take steps to acquire the land. It had been expected condemnation would be necessary to obtain some of the property, but in this instance agree-

ment was reached by owners of the real estate and the city for outright purchase by the city. So every piece of machinery was set in motion to complete these two units at the earliest possible date.

Types of Buildings Carefully Considered

A great amount of thought, time and effort was devoted to selecting the type of buildings to be erected. Our Joint Committee, the architects and city officials visited many other cities and decided to try two different kinds of construction, each a distinct type of operation. One was to be a spiral open type ramp building of concrete cantilever construction (Fig. 1.) started in May 1950, and completed and ready for operation March 1, 1951; the other a mechanical operation consisting of a combination crane and elevator in a nine-story building, known as the Bowser System. The decision was made early that these ramps would be strictly for parking purposes with no selling of merchandise or servicing of cars permitted.

First, thought was given, but abandoned, to constructing standard types of buildings that might be used for other purposes in case the garages failed. However, on the assumption the project would succeed and not fail, one-purpose buildings were designed and agreed upon.

The spiral type ramp, now completed and in operation, occupies ground space 132 feet by 132 feet, has five levels and accommodates 350 cars; an entrance or loading magazine of 44 feet by 132 feet, allows three lanes for in and out loading. (Fig. 2.) Attendants reach the various levels by a man-lift and a center stair well. In the morning incoming traffic uses two lanes and in the evening two lanes are used for outgoing traffic. (Fig. 3.) The location of this spiral ramp is within a block of the heart of the retail and business district.

On the Joint Committee's recommendation, the City Council leased this property to a private operator on a bid basis. The city also reserved the right to determine the fees and method of operation.

The fees in this instance are 25 cents for the first hour and 10 cents for each hour thereafter with a maximum of 75 cents for twelve hours. The location of this ramp does not lend itself to a twenty-four hour operation; however, cars left overnight are charged the maximum of 75 cents. Hours of operation are from 9 A. M. to 12 P. M.

FIGURE 5. Bowser System Parking Garage in Des Moines, Iowa

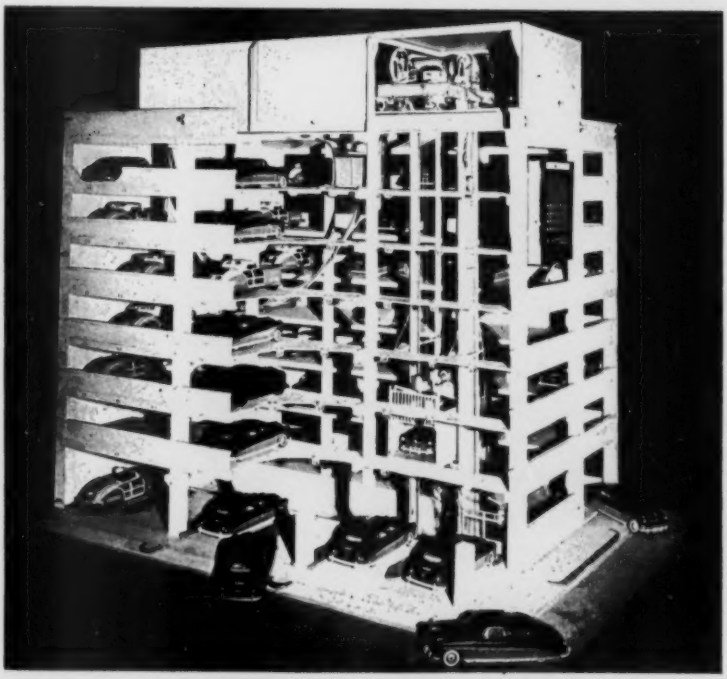


FIGURE 6. How the Bowser System works

The type of construction and nature of operation lend themselves to quick service, a real attraction to the short-time parker. (Fig. 4.) The average time for bringing a car to the customer is from one to two minutes, never longer than three minutes.

The other structure is at Fourth and Locust streets, in and near our heaviest hotel and theatre area. It is a nine-story elevator type of building occupying a space of 78 feet by 124 feet. (Fig. 5.) This being a narrow space it seemed particularly well adapted to the elevator type operation. Here again provision was made for keeping cars off the street, as the approach is on the street level, consisting of fifteen stalls occupying the full 124 feet. When the owner drives his car into a stall, it is taken by an attendant and driven on to a combination crane and elevator lift. (Fig. 6.) The attendant then presses a button which designates a particular stall and the car travels to that location accompanied by the attendant.

Car is returned the same way, moving in another direction to avoid congestion at the entrance. The garage was designed by Dano Jackley, an architect in Baltimore, Maryland, with Nemmers, Clark and Spooner, architects of Des Moines, as consultants. The Bowser Engineering Company designed the mechanical equipment, the first of its kind in operation.

Following the enactment of necessary legislation, the approximate cost of land and buildings was determined and a bond issue of $1,250,000 was offered by the city. Bonds were sold at public auction at an interest rate of 1¾ per cent plus a premium of $11,350. The favorable sale was due, we believe, to a large extent, to the provision by law that one-half mill tax may be levied to secure payment of the bonds. We believe this is the first issue of bonds to be sold and retired from the following three possible sources of revenue:

1. Revenue from rental of the garages
2. Proceeds from the 75 per cent surplus from parking meter funds as provided by the state law
3. General tax levy by the City Council of one-half mill, if other revenue is not sufficient

Under this program the bonds will be retired serially over a period of nineteen years but bonds due in 1961 and after may be called for payment at the option of the city beginning August 1, 1960.

Economically Sound Parking Plans in a Suburban Town of 8,000

CARLTON HILL

Mr. Hill started as a reporter on the Hartford Courant in 1924 and has spent practically all the years since then on Connecticut daily newspapers in Bridgeport, Norwalk and Meriden. In 1947, he took up the editorship of the New Canaan Advertiser, a paper which had twice been awarded prizes as the best of its class in the United States. In 1948, the New Canaan Advertiser won that top award for the third time; in 1949 it won an award for its editorials, and recently Long Island University awarded the paper a George Polk Memorial prize for community service in 1950.

NEW CANAAN, a suburban town of 8,000 population, a little more than an hour's ride into Connecticut from New York City, has been praised for many things. Someone once called it "The Next Station to Heaven," and the nickname has become a challenge to its people and their leaders.

With a rate of growth that experts predict may double or triple its population before long, New Canaan has sought to meet and beat the problems overwhelming other communities caught in the ever-widening whirlpool of metropolitan commuters. Fortunately, not the least of the virtues of "The Next Station" is the ability of its citizens and their elected officials to see what is coming. Foresight and hindsight into the experiences of other towns have led to intelligent planning for the future.

The objective has been a self-contained community with a balanced economy. Through such a plan, its leaders believe they can avert the fate of other towns in "Suburbia" that have lost their individuality and placed the terrific cost burden of expanded civic services upon home owners.

Typical of this sort of planning are the steps New Canaan has taken to solve the most vexing problems of the automobile age. Failure of so many towns and cities to shape their growth properly in this regard had provided ample case histories of sad examples.

Probably nobody ever actually made that fabled remark about the automobile never replacing the horse. But for a long time the motor car did remain a luxury. Certainly it would be wrong to censure the people of that era for not fore-seeing the day when an attached garage would be considered an essential part of a home.

Civic planning—or lack of planning—then was based upon the idea of serving customers who traveled in public conveyances from their homes to mercantile centers. Compact groups of stores covering almost every available bit of ground were ideal because they required a minimum of walking from the trolley and bus stops and around the stores. Complicated often by narrow and poorly laid-out streets, this fixed pattern of business districts has become one of the major headaches of the modern auto age. There simply isn't room in such centers for the thousands who want to go shopping in their own cars.

As a result, trade has been moving out to new shopping centers built around big parking areas for the convenience of motorists. Chain stores and other large firms best able to meet the cost of change have led the parade to the outskirts of towns and cities, and business is dying in the centers.

New Canaan Planned Ahead

New Canaan today might have been facing the same prospect. Its merchants might have seen business drifting away to shopping centers on the northern edges of Norwalk and Stamford, only ten minutes' driving distance away. After all, the town's mercantile center started in the familiar compact pattern.

But it didn't happen. On the contrary, business is wonderful in New Canaan today. The town's volume of retail trade is far above average for its population bracket. Customers come to New Canaan from Norwalk and Stamford and the town of Darien on the south, from Wilton on the east and from New York's Westchester County on the north.

What has happened is cooperative planning by town officials and merchants to develop an attractive business district with convenient parking facilities. Ample off-street parking takes care not only of the increasing number of shoppers but also of numerous commuters

using the railroad terminus almost in the heart of the town. A recent survey by the New York Regional Plan Association revealed that New Canaan contains the greatest number of off-street parking spaces in ratio to residents among sixty towns studied in New York, New Jersey and Connecticut. The town's four municipal parking lots provide one space for each seventeen residents, as against a regional average of one for each fifty-five.

Since 1941 a total of $217,000 of town funds has been invested for land and for developing these lots. This year the town voted another $160,000 to eliminate an unsightly bottleneck on one of its principal business streets. Believed to be in large measure a return from this investment, retail trade in the same decade has multiplied five times. From a little more than $4,000,000 in 1939, gross sales volume rose to more than $20,000,000 last year.

Canaan Parish in 1801

Perhaps a few facts of history and geography may tell the story of "The Next Station to Heaven" more clearly. New Canaan lies about five miles north of the town of Darien which is on the old Boston Post Road and also on the New Haven Railroad's main line from New York to Bridgeport, New Haven and Boston. The Merritt Parkway, north of and parallel to the Post Road, crosses New Canaan just above the town's southern boundary.

To the southeast is the city of Norwalk and to the southwest and west the city of Stamford. The northern boundary is the New York state line, with the townships of Pound Ridge and Lewisboro, New York, beyond. To the east is the town of Wilton, again in Connecticut.

In traditional manner, Main Street grew up along a through highway. The routes north from Stamford, Norwalk and Darien converged on what was then the only business street. In late years the road from Norwalk has been moved several blocks east, while the one from Stamford swings past the railroad station, west of the center.

Until two decades ago, stores were centered on two blocks of Main Street and one short, narrow block of Elm Street running off at a right angle to the west. This street—its name changed to Railroad

The newest parking lot, south of Elm Street, still must be paved and marked off before completion.

Elm Street (north side) looking east from the Railroad Station corner at Park Street. Colonial design prevails on both sides of the street through this block.

Main Street looking north below Elm Street shows the varied facades of old and new buildings. New parking lot is just off to left of picture.

North side of Elm Street looking west. Elimination of overhead wires to improve looks of center has been urged for years by the local newspaper.

Avenue and then back to Elm Street—originally came to a dead end in open fields. This old area still presents a patchwork of buildings. Some are new, some are old structures with modernized fronts and a few remain unchanged.

Before incorporation of the town in 1801, Canaan Parish, as it was formerly known, was divided almost equally between the townships of Stamford and Norwalk. In sharp contrast to its present residential nature, New Canaan's population of 1,599 was then beginning to shift from farming to industry in the early days of the machine age.

Historians, tending to give this period an aura of romance, speak of a countryside "dotted with little shoe shops" in 1811, with scores of artisans turning out 50,000 pairs of shoes a year. Actually these artisans were farmers and their boarders who trekked to town to pick up materials and then worked through the night to eke out meager incomes. This was industry's "home work" era.

Profits were high and made the first half of the 19th century a boom time in New Canaan. Bigger and bigger shoe factories grew up in the center of town. There were tool makers, too, as well as tanners, butchers and millers who ground wheat and sawed lumber. Woolen mills and shirt shops flourished and everybody thought in terms of a great industrial future.

This was understandable, since by 1837 the shoe business alone had a volume of $400,000 a year with the town ranked third in the industry in the country and first in the manufacture of women's shoes. The War of 1861-65 was only a minor interruption. Business leaders started the New Canaan Savings Bank in 1859, and the First National Bank and Trust Company in 1865.

The same business philosophy built the New Canaan Railroad, which the banks helped to finance in 1866. Townspeople didn't want neighboring communities to get ahead of them in the rush for railroad service after the war.

Even in the twenty years of disillusionment that followed—including the boom and bust of 1870 to 1880—the founders of the railroad little dreamed it was destined to bring a type of prosperity far different from the one they conceived for their town.

After a disappointing start, the line connecting with the New

Haven, or Consolidated Railroad at Stamford did pretty well until the five-year depression which followed the panic of 1873. In 1878 it went into bankruptcy. The trustees finally formed a new company, with a lease arrangement that gave the Consolidated majority control and full ownership by 1890. Built at a cost of $264,000, the branch brought only a little over $100,000 in the sale.

Plans for extending the line northward to Ridgefield and Danbury never materialized and it remains at dead end in New Canaan. In 1899, it was electrified, one of the first in the country, and by 1904 the New Haven Railroad yielded to pressure to establish through-express trains for commuters to New York.

Industry in New Canaan shared the fate of the railroad venture. By the turn of the century shoe factories and mills were discovering they were too small to hope to compete with the mass production of big plants and, one by one, they faded from the scene.

A transition had already begun by then, however. There is no evidence that the town ever suffered from a "ghost town" pessimism. Gradually, the New Yorkers who had "discovered" the town as an ideal summer residential place were deciding there was no reason why they couldn't commute the year around.

By the 1920s the new type of prosperity was beginning to make itself evident. Beyond the one block of stores west of Main Street on Elm Street open fields had stretched to the railroad station. When the late John E. Hersam built a new office for his newspaper, the *New Canaan Advertiser,* in the middle of this block between South Avenue and Park Street, many persons said he was moving "out into the country."

But Mr. Hersam, who had adopted the motto "Grow or Go!" for the paper he had founded in 1908, knew his town. Today the Advertiser office is in the middle of a beautiful development of stores with a conforming colonial design, stretching in an unbroken facade from South Avenue to Park Street. This block of Elm Street, wider by twenty-two feet than the old block, is the heart of an expanding business district.

Within the past two years the last vacant lots on this block have been built over and a taxi office and garage have been replaced by stores. Nor is the end of this growth in sight. Building lots have been

sold for stores down South Avenue and there is talk of possible mercantile development in Cherry Street, the next street south parallel to Elm Street.

Other communities have gone through similar periods of gradual or more rapid growth, but here there has been a difference. Instead of allowing business enterprises to use every available foot of space for stores, the town has made sure that a large section within these central blocks was reserved for off-street parking.

Resistance Overcome

At first, some resistance developed. An appropriation of $17,000 to buy and develop the first municipal parking lot was rejected once by a town meeting. But First Selectman Clarence E. Costales tried again and a second town meeting in the same year, 1941, approved the funds.

This is one of three lots north of Elm Street and west of Main Street extending the length of the two blocks to Park Street. The $17,000, consisting of $14,000 for the land and $3,000 for development, was for the lot nearest Park Street. Here 150 cars, most of them owned by commuters using the nearby railroad station, are parked. There is also parking space on railroad property for them.

Halfway down the block, the owners of the motion picture theater had provided a lot in the rear to accommodate 100 cars, with a sidewalk leading by the theater through to Elm Street. This lot the town leases for public use at a rental of $1 a year.

The third lot, again owned by the town, is at the rear of the town hall, which faces on Main Street. There is room for fifty cars in this area at present and there will be more spaces when plans to move the town garage and its equipment out of this section are carried through.

Watching the apparent benefits of this planning in business growth through the 1940s, First Selectman Costales saw it would be necessary to provide even more parking areas. The Town Plan Commission, created during the depression years before World War II, studied means of expanding the program.

When the officials learned a large part of the block south of Elm

Street, between Main Street and South Avenue, could be purchased, they decided this would be a perfect site for another municipal parking lot. But it was an ambitious project involving an expenditure of $200,000 and they didn't know how the citizens would receive their proposal.

The value of the program had, however, been recognized. In December of 1949 only a few dissenting votes were cast as a town meeting approved a bond issue to pay $186,500 for the land and $13,500 to improve it. Last year a former hotel in Main Street, used of late as a rooming house, was torn down. Two dwelling houses on Cherry Street, the south boundary of the lot, were sold and moved to new sites.

The area was graded and paved, and spaces have been marked off in it for 180 cars. This makes a total of 480 off-street parking spaces within easy walking distance of all the shops in the center. And this newest lot will serve the section in which it now appears future growth of the center will occur.

As a sequel to this last accomplishment, a long dreamed of improvement has been made possible just this year. The bottleneck of the old end of Elm Street from South Avenue to Main Street will be widened. Store fronts on the south side will be cut back twenty-two feet and remodeled to conform with the rest of the street.

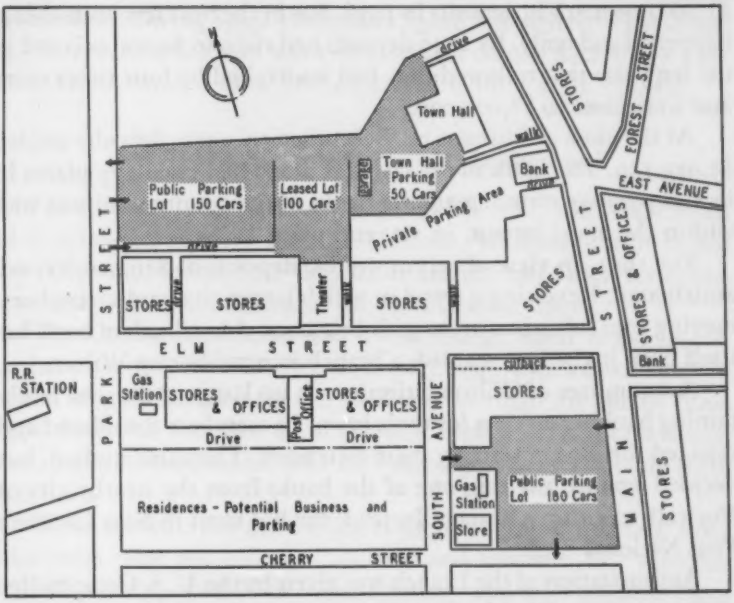
For many years the need to do something about narrow sections of both Elm Street and Main Street had been apparent. A variety of plans, including a diagonal street from Main to Elm from the north had been considered, but never went beyond the discussion stage.

Sidewalks were cut back to widen part of Main Street and development of the newest parking lot made it possible to push the curb line in Main Street back ten feet in that section. But Elm Street, although new building lines had been established, was still the big traffic bottleneck.

Finally, with completion of the new parking lot, the Town Plan Commission decided the time for action had arrived. It would now be possible, it was pointed out, for property owners on the south side of the street to extend buildings in back and new store fronts could also be developed facing on the parking lot and providing two entrances.

$377,000 of Public Funds Invested

Most of the owners saw the advantages of this plan, although a few objected and refused to accept offered terms. Despite apparent need for condemnation action in these instances, the widening plan



was at last placed before the voters for the first time. And a town meeting in January of this year decided it should be done, approving a bond issue of $160,000 for it.

Adding it all up, New Canaan's total investment from public funds in its business center is $377,000. So, it is logical to ask whether the investment has paid dividends. And a look at just one business institution, the First National Bank and Trust Company, provides a striking answer to the question, so far as the prosperity of the town is concerned.

The bank was founded in 1865, six years after the New Canaan Savings Bank. The same business men who later started the railroad were interested in both of the banks and there was a common ownership of stocks and the same quarters were shared through 1928.

The banks weathered the period of transition more successfully than the railroad. There was a decrease in deposits during the hard times from 1879 to 1889, but they were back to normal, although not spectacular, figures by 1910.

It took seventy-one years before the First National Bank hit the $1,000,000 mark in deposits in 1936. But in the next few years things happened suddenly. By 1940 deposits had risen to $2,000,000 and in the ten years that foliowed they had multiplied by four times more and were close to $8,000,000.

At the close of business on December 30, 1950, deposits totaled $7,925,149. The bank in the last year alone had risen 379 places in its comparative standing among banks of the country and was well within the 2,300 largest, in 2,272nd place.

For 1951, in view of recent events, deposits of $10,000,000 are anticipated. Reversing a trend in which larger city banks have been moving into suburban areas with branches, this suburban bank has itself been invited to establish a branch in neighboring Wilton.

A committee of Wilton citizens took up last year the idea of obtaining banking services for their town. Its members considered and rejected the idea of starting their own bank. They also studied, but decided against, inviting one of the banks from the nearby city of Norwalk to set up a branch. Instead, the bid went to New Canaan's First National Bank.

Authorization of the branch was given by the U. S. Comptroller of Currency in Washington. The New Canaan stockholders approved a refinancing to bring total capitalization to $500,000 and the $10,000,000 deposit figure seems assured for 1951—ten times the total reached fifteen years ago.

With the New Canaan Savings Bank keeping pace, total bank deposits in New Canaan at the end of 1950 were $14,651,067, more than 400 per cent higher than 1940. The Savings Bank reached the $1,000,000 mark earlier and was up to $1,719,000 by 1929 and $2,119,000 by 1939, with the 1950 figure $6,725,918.

The same average of an increase by five times the totals of 1939 prevails in all business statistics of the town. Of course, some of this has been due to inflated values of the economic spiral that is still climbing higher and higher.

Some of it can also be explained as a reflection of population in-

crease from 6,221 in 1940 to 7,968, in 1950. But these same factors are present in neighboring towns like Darien and Westport, which have a similar suburban character and which have an advantage of about 3,000 in population totals. Yet the rate of business growth in these towns has not matched New Canaan's.

In the 1940 census an estimate was made of total retail business in each town during 1939. Westport's figure was highest of the three, $4,300,000. New Canaan was a close second then at $4,216,000 with fewer retail outlets, while Darien lagged behind at $2,858,000.

Retail Sales in New Canaan Take the Lead

Ten years later, New Canaan was far in the lead, with total retail sales estimated at more than $20,000,000. Westport business was about $2,000,000 less than this, while Darien had fallen far to the rear, nearly $10,000,000 under the New Canaan figure.

The Connecticut State Tax Department, when it began collection of a newly enacted sales tax in July, 1947, kept a town-by-town record of gross business for the fiscal year through the end of June, 1948. After the first quarter of the next fiscal year, this breakdown was abandoned, however, and no exact figures are available since that time.

These statistics did not tell the economic story completely, since sales taxes were not collected on food and gasoline. But they did provide a pretty good basis for estimating total sales volume. Here are the sales tax figures for the three towns for the 1947-48 fiscal year:

New Canaan, $19,100,000; Westport, $17,200,000; Darien, $9,500,000. From the same source for the first quarter of the 1948–49 fiscal year, the totals reported were: New Canaan, $4,724,468, with 212 businesses reporting; Westport, $3,808,309, with 368 businesses reporting; Darien, $2,332,814, wth 255 businesses reporting.

The last figures are for one of the dullest business seasons of the year, the July, August and September quarter. From them it is safe to guess the New Canaan total for the 1948–49 fiscal year, adding in food and gasoline sales, was well over $20,000,000, as compared to $4,216,000 in 1939.

Now these three towns are much alike in many respects. All have a high percentage of commuter residents. There isn't much differ-

ence in the income level of their people, which is relatively high. In other words, all have an equal potential source of trade.

Westport and Darien do have one disadvantage, however: Both are on the Boston Post Road, which is now so over-burdened with truck traffic that there is a pressing need for a new all-purpose highway to relieve its load. And the business districts of both of these towns are centered along the Post Road.

There was a time when a main highway through a town was considered to be an asset. Some of the communities on the Post Road protested that business interests were being damaged when the State Highway Department started building by-passes for through traffic.

By the time the Merritt Parkway, which now carries the great bulk of passenger cars across the state, was built, this point of view had changed. Town officials had learned by then that more harm than good was being done by the constant traffic jam in their main streets.

'No Off-Street Parking Lots in Darien'

Darien, New Canaan's nearest neighbor, has practically all of its mercantile business strung out along the Post Road. It also has the added problem of a main line railroad bridge, too low to allow passage beneath it by the bigger trucks on the road today, across the Post Road right in the heart of the center.

An alternate route through residential streets has been marked off, but many truck drivers still try, with disastrous results, to negotiate the underpass. This situation will be relieved as soon as the State Highway Department completes a current by-pass route project.

Darien's census count was 11,278 in 1950 as compared to 9,222 in 1940. But the statistics given above show much of its trade must have gone to the cities of Stamford and Norwalk and to New Canaan. This was evident in the $2,000,000 difference on the minus side in 1939 and even more so in the $10,000,000 lag in 1948.

Darien has *no* municipal off-street parking lots. That brief statement seems to carry heavy proof of the value of the good planning New Canaan has carried out. It offers evidence to demonstrate the dividend being received from New Canaan's investment.

Elm Street (south side) looking west from South Avenue corner. Postoffice is in setback in middle of the block.

The New Canaan railroad terminus, looking west from Elm Street, is little changed from the days when it was built as an aid for industry.

Westport, with a present population of 11,568 as against 8,258 in 1940, has lately come to realize the need to do something about the parking problem. But before this realization came, it has seen its volume drop from the slight advantage over New Canaan in 1939 to a deficit of about $2,000,000 by 1948.

The Post Road is also a problem for Westport, although some of its mercantile business has spread to streets leading off the main highway. Even so, it is looking hopefully to the day when the stream of trucks by night and day is detoured to some other route.

With its newly awakened interest in off-street parking, Westport is hoping to keep at home some of the trade which has been drawn off to cities and towns nearby. It has learned, in other words, that an investment in planning will bring returns in better trade.

Insuring a Healthy Growth

But that's enough of comparisons to prove the point. Now let's look at what New Canaan is doing to make sure the future growth of its business district will be as healthy economically as it has been during the last decade.

Interest in the subject of zoning controls to insure parking space for future business development was brought to a focus last year when the New Haven Railroad announced it would accept offers to purchase its railroad stations from firms interested in building shopping centers around ticket offices and waiting rooms.

The problem that would result if commuters now using railroad property had to seek parking spaces elsewhere was immediately apparent. Even New Canaan's generous provisions for parking would be taxed beyond capacity if it became necessary to find room for seventy-five more automobiles.

Although a cloud on the title to the local railroad station land made its sale unlikely in the near future, there were firms interested in buying it. First Selectman Costales and the planning and zoning officials saw that something must be done and done quickly.

Mr. Costales called upon officials of area towns facing the same problem to join him in seeking protection through the Connecticut Public Utilities Commission or the U. S. Interstate Commerce Com-

mission. He also invited these officials to meet with him and plan uniform zoning ordinances.

From these efforts it was learned the towns would have to depend upon their individual regulations. Attention was centered, therefore, on drawing up amendments to zoning laws which would require the provision of off-street parking in any new business development.

Cooperation between business leaders and town officials was again responsible for the final form of the zoning rules adopted in New Canaan. The first draft was rejected because it was too general to fit the town's specific circumstances.

In this draft it was decreed that all new business buildings, whether stores, factories, restaurants, theaters or transportation terminals, must provide a number of off-street parking spaces based either on floor area of the buildings or seating capacity.

This, it was pointed out by business leaders, would impose a hardship on developers around the immediate perimeter of the present business center. There just wasn't enough land available in this area to make parking lots for each new building feasible, it was stated.

However, the businessmen said, a common area for an entire block could be worked out cooperatively. They were even willing, they said, to accept a special tax to meet the cost of town development of such a lot if it were needed in addition to the municipal lots now serving the section.

Zoning Law Amendment

The final draft of the zoning law amendment was a compromise. A circle was drawn around the present center, exempting the area within it from the regulations. Outside this circle, any new enterprise would have to furnish both parking spaces and room for truck unloading and loading.

The problem of railroad station parking was covered by a requirement specifying a total of parking spaces based upon the square foot area of the waiting room and ticket office, plus the train platform, in any new development which might follow sale of the station property.

This was embodied in a general rule for all transportation termi-

nals. Individual homes, apartment houses and offices outside the business district were also covered. The new regulations would take automobiles off the streets in any potential use of land throughout the town.

Having already taken care of current need for off-street parking, New Canaan is thus protected for any future growth. By law, the town cannot now return to the pattern of congestion which has become such a headache to so many towns and cities.

Further insurance for a balanced community growth is being written with the assistance of a firm of planning experts now engaged in a two-year project to devise a long range program for New Canaan, taking in all phases of administration of the town's affairs.

From a study of trends of growth in the town and the surrounding areas, the experts will extend their prediction of things to come. A schedule of capital improvements to fit prospective income will be drawn up. And the regulations needed to guide the growth in the proper directions will be recommended.

New Canaan believes it can furnish in the years to come the civic services which would be required if its total of residents doubles or triples, without placing a crushing burden of taxes upon home owners—a fault prevalent in communities overbalanced on the residential side.

Increased tax revenue is already coming in from mounting mercantile inventories. Light industries and factory offices are being encouraged as another source of tax funds. Every effort is being made to reach as much of a balance as possible to share the cost of growth.

There is, of course, the usual nostalgic regret of old timers, the fear over sacrifice of New Canaan's "nice little village" character. But at the same time there is a realization that, since the tide cannot be stopped by edict, it is best to shape it into a desired pattern.

"The Next Station to Heaven" has within it a goodly number of citizens determined to live up to that nickname. In cultural pursuits and in community spirit, as well as in good civic planning, they intend to make sure their home town does not lose its self-contained individuality.

Future Traffic Problems Loom For the Medium-Size City

C. A. HARRELL

Mr. Harrell has been city manager of Norfolk, Virginia, since 1946. Previously he had served as city manager for Portsmouth, Ohio, Binghamton, N. Y., and Schenectady, N. Y. In 1938 Mr. Harrell was a delegate to the Inter-American Congress of Municipalities in Cuba; during 1941–42 he served as a consultant for the National Defense Commission, and with the War Production Board. He is a member and past president of the International City Managers' Association, and first vice president of the National Council for Community Improvement; and a member also of the American Society of Civil Engineers, the American Society of Planning Officials, the National Management Council, the Municipal Finance Officers Administration. He is the author of articles dealing with various phases of municipal government, including "Fiscal Problems of City School Administration, New York State," with Dr. Luther Gulick.

THE MOST important problems of a city government deal with the efforts of its citizens to make a living. A city's first responsibility to its inhabitants is to facilitate their honest economic life.

On the surface this may seem a startling statement but a close examination of city life would reveal its basic truth. Problems of safeguarding health and public safety, providing educational, recreational, and cultural facilities, and improving living conditions in general can be solved if citizens are willing and able to pay the cost of these services. Obviously, if a citizen cannot make a living he will be unable to assume his portion of the burden of providing the many services offered by the modern wide-awake city. Nor will he be able to obtain the private necessities and luxuries characteristic of twentieth century urban life.

Today's urban breadwinner would be completely stymied without adequate transportation. Adequate transportation facilities have become the *sine qua non* of city living, essential to every person and

to every enterprise. Over the years this has become increasingly true, until today the very economic existence of any city depends upon the ability of its transportation facilities to move people and commodities smoothly and efficiently. Adequate facilities for all forms of transportation are essential to a city's growth, welfare, and prosperity.

Vehicular transportation most directly concerns a city because the people and commodities moved by any method into the metropolitan area—by air, rail, water, or land— are distributed in the end by vehicular transportation. In a medium size city most of the movement is by motor vehicles: automobiles, buses, trucks, taxis. Of these, of course, automobiles are in the greatest number; buses are largely replacing street cars; and trucking is a steadily growing industry.

Stagnant traffic conditions on the streets and highways can paralyze a city economically. Uncontrolled decentralization, more and more evident, can be traced directly to the phenomenal rise in private automobile ownership. The automobile has contributed greatly to the possibility for suburban living, and by helping produce downtown traffic congestion is responsible for the rise of satellite shopping centers. If decentralization is not controlled through long range municipal planning, it will ultimately mean loss of revenue to the city and will produce an unstable tax structure.

The decentralizing trend is also increasing mass transit problems. To serve satellite shopping centers and sprawling suburbs, transit lines are duplicated in many instances and must often operate over long distances in sparsely settled areas with a consequent low revenue return.

Modern industry, commercial houses, and distribution centers now depend to a great extent on adequate streets and highways, and their business can be crippled by poor circulation of vehicular traffic.

Net results of traffic congestion can be a very real problem to any city. Merchant and real estate taxes will be reduced. Transit facilities operated without a reasonable profit because of traffic congestion are unable to pay the city for the use of its streets as well as other taxes. Equally serious is the threat that industrial and commercial houses and distribution centers will leave and locate in other cities to avoid the *costs* of traffic congestion.

Since traffic congestion is so vitally connected with the prosperity of the city, it behooves city officials to study causes of congestion carefully and to consider the results it has produced and may produce in the future.

What Lies Ahead in Traffic Volumes?

Traffic *volumes,* in the final analysis, must form the basis for all traffic planning. The planning of adequate traffic facilities should be predicated upon surveys of present volumes and the volumes which can be anticipated over the years. What lies ahead in traffic volumes is the question that has to be answered.

In this connection it is necessary to consider all economic and social conditions affecting the number of vehicles on streets and highways. Foremost among these conditions are (1) overall population increase in the United States and (2) rural-urban migration. Current trends have sent the national population to 150,000,000 and a greater and greater percentage of the total to metropolitan areas. When population tables are examined, there is nothing to indicate that these trends are reversing. Most population experts do not predict any leveling off of national and metropolitan populations before 1975.

Another important question, especially at this time, is how much the production of automobiles, buses, and trucks will be cut because of military emphasis and how this cut in production will affect street traffic. Temporarily, military needs may cause civilian traffic volumes to remain reasonably close to their present level except in areas where defense, military, naval, and air installations are resuming or expanding operations. In the case of an all-out war, it may even cause a reduction in traffic volumes for years to come. But as soon as normal production is resumed traffic experts agree that traffic volumes will continue to rise and thereby multiply today's problems.

Likewise, the question of whether the ratio of automobile owners to non-owners will increase is important. Better economic conditions or lower priced automobiles may cause traffic volumes to increase faster than their normal rate. Moreover, if plans now on the drawing boards in many states to build more and better highways from the cities into the hinterland materialize, more people and commodities

will be carried into and out of the trading centers, thus increasing traffic activity.

Problem of the Medium-Size City

With all signs pointing to increased traffic volumes, the medium-size city may find its traffic problems the most difficult to solve of any population group. Generally, in the medium-size city large traffic volumes are now being moved over inadequate facilities. Volumes as high as 50,000 vehicles a day are not uncommon on important arteries and streets of the medium-size community. Few of our largest cities carry volumes any higher than this except on a few selected streets.

When traffic volumes on an ordinary street reach this point, it is certainly time to think about building expressways. But the medium-size city may be unable to finance the building of expressways designed to carry large volumes of traffic. Land costs in expressway areas are often prohibitive, and the high cost of construction might mean that other services would have to be curtailed. As an example, twenty-nine miles of the Los Angeles Arroyo Seco Parkway cost $70 million, and four miles of Houston's Freeway cost $7 million. Such heavy expenditures in a medium-size city will force its officials to seek various expedients and outside aid.

Federal and state funds for urban highway development are available in many instances and their possibilities should be fully explored. Furthermore, cities fortunate enough to have a slum clearance and urban redevelopment program may find that expressway building in the redevelopment area is now entirely possible and highly desirable. When the land is cleared of sub-standard dwellings, portions of it may be used for expressway and arterial highway development.

Also, toll facilities of which the actual users bear the cost are becoming popular in highway construction. But their practicability for city use is extremely doubtful. In a city where many routes lead to the same destination, it is probable that most motorists will prefer to use free facilities even though the toll facilities provide a quicker and safer route.

The medium-size city therefore must consider the cost of its traffic solutions from every angle. It should exhaust all avenues of research so that its capital expenditure budget for traffic planning can do the most good where it is most needed.

Revised Street Plan

Before determining what facilities will be necessary to carry street traffic loads, an inventory should be taken of existing facilities and equipment for carrying present traffic. If the city is of any considerable age, chances are that the *street plan* designed for horse-drawn vehicles is entirely inadequate for present day motor vehicle use. Even though the present street plan appears to be inadequate as far as width of streets is concerned, a survey should still be made to determine whether, with a little widening and improving, sufficient arteries could be developed at reasonable costs to serve for many years to come. However, it is frequently true that an entirely new street in a new location to meet future needs could be built at the same cost as the piece-meal widening and improving of existing streets.

Off-Street Parking

The provision of *off-street parking* facilities ample enough to permit the prohibition of curb parking in the downtown area is an inexpensive way of widening streets without actually moving the curbs. This plan avoids the heavy costs of construction and of acquiring expensive additional right-of-way in the heart of the central business district.

Ample off-street parking space can be provided by (1) zoning regulations that require new commercial and industrial structures to incorporate off-street parking space, and (2) municipally owned or regulated off-street parking lots.

In Norfolk, a 1950 zoning ordinance requires new commercial structures to provide off-street parking and loading facilities. And Norfolk is currently considering an off-street parking plan for the city to purchase and operate five downtown lots. Through parking meters these lots will be self-sustaining. The cost of purchasing the

land and installing the meters will be paid with twenty-year revenue bonds. When the plan goes into operation curb parking will be prohibited on many downtown streets.

Efficient Mass Transit

The condition of a *mass transit system,* it is believed, will play an ever-increasing role in the future development of the medium-size city. Fast, efficient, low-cost mass transit service may be the ultimate answer to traffic problems in the medium-size city. This is obviously true in the larger cities where the preponderance of people are carried by mass transit. The medium-size city should certainly consider developing a transit system to give such rapid, convenient, and economical service that it would become the backbone of the transportation facilities. In short, the medium-size city should develop such an efficient transit service that citizens will find it more convenient to leave their personal automobiles behind and take a bus to the central business district.

Traffiic Control

Traffic control in many cities has been more or less a hit-or-miss proposition that has been developed in an attempt to serve present traffic problems but not to prevent future traffic congestion. Minor improvements in traffic control, equipment, and methods can often produce sensational results.

Law Enforcement

The kind and quality of police *traffic enforcement* should be thoroughly investigated, for no traffic control program can be better than the enforcement which is necessary to keep it functioning with the greatest efficiency.

Traffic Surveys

Traffic surveys of all types are essential for a factual approach to today's traffic problems. These surveys should be as extensive as

possible. A dollar spent today in an attempt to ascertain the traffic needs of the motoring public may save many costly errors in the location of facilities for tomorrow's traffic needs.

Once the inventory has been taken and surveys conducted to determine what should be done, plans and cost estimates can be prepared for a traffic system that utilizes *present* facilities. At best this plan will be only an expedient. An overall master plan should also be prepared at this time for long-range development of the traffic system. This plan will seek *basic* improvements and probably entail considerable capital outlays.

While cost estimates for traffic improvements in the medium-size city may make its officials "want to throw in the sponge," traffic as well as other improvements must be measured not only in terms of what they cost but in terms also of the overall benefit produced. A traffic improvement program may well pay for itself over a period of years by controlling decentralization, preserving the tax structure, and enabling the city government to function more efficiently. For example, Norfolk spent $10,000 for a traffic signal at a single intersection. When criticism arose over this expenditure, it was pointed out that this one traffic signal relieved five traffic officers for duty elsewhere. Assuming that the traffic officers earned $200 a month, it would mean that in ten months the traffic signal, which was considerably more efficient than the traffic officers, would pay for itself. The point of basing improvements on benefits derived, as well as on costs, must constantly be kept in proper focus.

Future traffic problems of the medium-size city present a formidable obstacle. Barring a prolonged world war, civilian traffic volumes will continue to increase as national and metropolitan populations grow; as there is more exchange of persons and commodities between rural and urban areas; and perhaps as engineers build—and the public accepts—smaller, less expensive automobiles.

But medium-size cities generally find themselves today with inadequate facilities to handle even existing traffic loads. The problem is particularly difficult for them because to pass from barely making out with existing loads to handling adequately the expected increased volume of the future will probably require extraordinary capital outlays.

City officials should not be reluctant to accept state and federal aid for urban highway development. Nor should they miss the opportunity to integrate traffic planning with urban slum clearance and redevelopment programs. Two of the most fruitful approaches to future traffic problems are emphasis on the mass transit system and off-street parking.

Smooth traffic circulation *will be* more and more a problem of medium-size cities. Those cities that face the problem squarely by making surveys, studies, and plans, and then appropriate the necessary funds, will in spite of immediate capital costs grow and prosper while their less inclined colleagues wither at the hands of TRAFFIC CONGESTION.

Fitting Truck Movement Efficiently into the Traffic Problem

AUSTIN C. KNETZGER

Mr. Knetzger, lawyer and interstate commerce practitioner, has for ten years been Secretary-Manager of the Association of Team and Truck Owners. He has been in the transportation field for twenty-six years: for eight years in the traffic department of the Laclede Steel Company; for two years an Erie Canal company official; salesman for a St. Louis truck line; four years in charge of traffic in the St. Louis field office of the Standard Oil Company. In 1943 and 1944, he was a member of the Missouri State Legislature.

THE traffic problem is composed of three user-elements: (1) passenger cars, (2) trucks, and (3) mass transport facilities. And a multitude of vehicles on our streets suggests that street facilities are inadequate. To the extent and in the manner in which streets are used today, this conclusion is correct.

It is not without qualification since a more careful analysis may lead to the conclusion that a change in the manner or method of street usage will accommodate the necessary units of transportation without burdening the streets with a corresponding increase in vehicle numbers. The thought behind this article is the idea of greater efficiency in *productive* street usage, as distinguished from *vehicle* street usage.

We have mentioned the three user-elements directly contributing to traffic congestion. We shall deal in this article with the truck traffic problem and arrangements under which it can be simplified. This problem extends well off the city streets and involves all truck users. Its solution will require the cooperation of public officials, shippers, receivers, building owners, all forms of property carriers (common, contract and private), mass transport facilities, architects, engineers and students. The alternative of widening streets may offer some relief, but is generally too costly and destroys buildings and utilities necessary to our well being. The problem then is one of conforming our street usage to our streets, or of abandoning properties because of traffic barriers created around them.

Truck registration has increased at about the same rate as that of other motor vehicles. As of now, what had been anticipated in 1940 as total registration of all vehicles in 1960, is the total registration in 1951. It has been impossible to keep abreast of the resulting traffic needs through new construction. Insofar as commercial vehicles are concerned, another result has been to increase delay time substantially, at the cost of productive time.

There is an interesting comment in this connection. The Liberty Mutual Insurance Company, in a study of pickup and delivery trucking operations in certain New England cities, found that trucking delays in traffic, represented not over 5 percent of total time.

Significant Delays

The significant delays in this field occurred at points of pickup or delivery. They resulted from numerous situations, among which were delays in getting to and from the shipping platform, and delays at the platform. These conditions were usually complicated by other vehicles arriving at the same point for the same purposes. With respect to getting to the platform, causes were classified as (1) no passing clearance, and (2) waiting for berth.

These causes are obvious. In other words, no passing clearance resulted when the street or alley necessary to reach the shipper's facilities was blocked by other vehicles or objects. Waiting for berth occurred when the shipper's facilities were occupied when the vehicle arrived. A forced wait resulted.

Delays in getting from the platform, characterized as "other pull-out," occurred when a vehicle, having received its load, was unable to move because other trucks at the platform, either loading or unloading, blocked its movement until they were ready to move. Delays at the platform result from goods not being ready, platform forces engaged in servicing other vehicles, goods misplaced on the platform, and a general confusion from numerous vehicles performing various operations of pickup and delivery.

The immediate result of these conditions is to back up commercial vehicles, block the immediate area, in many cases extend the blockade into adjoining streets where commercial vehicles wait

in line and create a barrier as well as a hazard to free traffic flow. The Liberty Mutual study showed that the resulting delay condition is very costly; that on the basis of their study more than one-third of the total time spent in pickup and delivery service represents delay. (To make up for this lost motion, the increase in number of vehicles will represent a factor of 50 percent in vehicle registration.) Vehicle costs range from 6 cents to 10 cents a minute: The resulting expense to the public is substantial. It has been estimated that the loss in ten of our major cities from this source runs in the neighborhood of $2,000,000 daily. This is a general picture of the situation as it exists today.

Vehicle delay, as pointed out above, produces traffic congestion. Understanding of the principal causes of commercial vehicle delay requires an historical approach. Before 1925, the motor truck had generally limited itself to the field of local service, but around that time came a rapid development of inter-city motor transportation. A great many motor carriers entered the field, and each one developed its own facilities for the pickup and delivery of less-than-truck-load traffic, and also presented their equipment at shippers' doors for the receipt or delivery of truck load traffic. Structural changes to accommodate these changes in shipping practices were slow in coming; in many cases they were impossible, due to lack of land area adjacent to established industries and buildings upon which to create facilities to meet the problem.

Before the advent of motor cars, inter-city transport facilities were relatively few. Our largest cities and principal terminal points were served (except Chicago) by not more than twelve to twenty railroads and four or five forwarding companies, a total of not more than sixteen to twenty-five carriers. Most of them offered service to broad territories all over the country; through one, two, or three carriers, a shipper could take care of his total transportation requirements.

The situation has changed greatly since then. It is estimated that the motor carrier industry will offer in the neighborhood of fifty regular route services in towns of 100,000 population, running in the neighborhood of 200 to 300 carriers in towns of a population of approximately one million. While these carriers may offer service to

large areas, for practical purposes, their operations are devoted primarily to areas and territories served by their own lines. All of the motor carriers, as well as the railroads and forwarding companies offer their own free pickup and delivery service. It is readily understandable how shipper facilities have stagnated and thrown a burden and barrier of commercial vehicles on the streets when such drastic changes have occurred within the course of a little over two decades.

A Freight Shift to Motor Service

In addition to the increase in the number of carrier facilities offering themselves to shippers, there has been a further marked development in the last ten years which intensifies motor vehicle delay. At the beginning of the motor carrier era, motor carriers largely devoted themselves to the transportation of less-than-truckload traffic. Technical advances in the automotive field have resulted in larger and safer equipment.

This has resulted in a substantial shift of freight traffic, formerly moved in rail carload units, to motor carrier service in truck load units. Industries having private rail sidings usually received their carloads at one location in the plant, and provided other facilities at another location for truck shipping and receiving. The shift from rail to truck movement on large volumes had the effect of jamming up the truck shipping and receiving facilities which previously had largely been devoted to the receipt of fewer truckload shipments. With truckload units placed at a shipping dock to load or unload truckloads of freight, the time factor involved in handling has the effect of backing up all other equipment attempting to make deliveries of less-than-truck-load traffic. This results in a backing up of commercial equipment on public streets. An easy solution would be the provision of more facilities; but land area is not available for development.

Many building owners, tenants and shippers have failed to understand that their facilities were adding to the traffic problem. They are a part of the approach to freer movement of all traffic as affected by commercial motor vehicles, and have the obligation to study their facilities. It can be said that in many cases the facilities are wholly

inadequate for their purpose, regardless of the arrangement under which they are used. This inadequacy begins with dock space. Even more important is the internal arrangement of the building for receipt and shipment of goods.

Dock space should be adequate to receive, temporarily hold and permit freight to be moved to and from the dock and in and out of the building. Within the building, adequate shipping room space is required both to receive freight and to place freight for loading to trucks as they are presented. Inadequate elevator service is another factor that impedes free traffic movement, and when coupled with a lack of shipping room space it creates serious delays to trucking equipment.

The elevators are the key to receiving room space on upper floors. There is need for centralized building control of elevators serving tenants on upper floors. In surveys, we have found this condition emphasized by antagonism between building tenants over elevator use. Building owners and tenants should cooperate in the use of these facilities, and improve them by faster elevators and better lighting. These parties should give consideration to the necessary capital investment required for the improvement of their properties.

One of the complicating factors in solving the truck congestion problem is the rapid development of the trucking industry. The trucking industry has expanded its terminal properties extensively, but it has confronted an unforeseeably great development, which day by day, week by week, has forced carriers from new terminal developments into different terminal developments with each new property becoming inadequate almost as of the date of occupancy.

This has been a complicating factor, since the industry has been unable to foresee and develop terminal properties to meet the onrush of public demand for motor carrier service. This situation has been a factor in the traffic congestion, resulting in serious congestion at the trucking terminals.

Land Availability

The trucking industry has been confronted with serious problems of land availability. Perhaps the most desirable arrangement from the

standpoint of the industry and of the public would be the development of trucking terminals within limited areas, or rather within definite areas. For example, in St. Louis the truck terminal development, until recently, has been within blighted areas adjacent to the manufacturing and commercial districts. As the industry has grown there has been a trend toward land speculation in these properties with small parcels being seized by speculators to realize a handsome profit. Another factor in these areas, working against terminal area development, has been the "cloud" on the titles of some properties.

The result has been a tendency toward decentralization of motor carrier terminals with terminals being developed throughout the city. Such a development, of course, means a considerable amount of added traffic on our thoroughfares for necessary purposes, but in considerable part, in the transfer movement of through freight between the various transport agencies. This is a problem worthy of consideration, particularly to the end of assisting the industry in finding proper locations at fair prices for its reasonable development.

For discussion, we shall call the St. Louis arrangement, the "St. Louis Plan." The St. Louis Plan is really an evolution. It attacks the problem from the standpoint of eliminating multiplicity of vehicles engaged in performing the same service. It is designed to move less-than-truck-load traffic from shipper facilities in solid truck load movement or to remove all that the shipper has for movement in one load.

The design is to secure maximum efficiency from necessary trucking movements. Less-than-truck-load freight is consolidated for outbound movement, as outlined in the recent United States Chamber of Commerce Study, "Solutions to the Problems of Merchandise Pickup and Delivery in Business Districts:"

"How Can Consolidation of Outgoing Freight Help?"

"Such an arrangement is in effect in St. Louis, Missouri, where the local cartage carriers perform a general pick-up service on outbound traffic for accounts served by them, receiving in one operation all traffic from the particular shipper or building, parcel post, freight, and all the types of pick-ups that may be required. Contractual arrangements have been entered

into between the individual railroads, forwarding companies, and the truck lines, for the performance of this service. The conflict of trucks calling for both inbound and outbound freight does not occur."

It is not a total cure, because of the trend to truck load movement, and congestion caused by trucks of the various inter-city carriers delivering the inbound less-than-truck-load movement. Yet the merits of the arrangement justify a more complete analysis of it.

St. Louis grew with the same limitations of street facilities, and the same types of buildings with which other cities have grown. It has narrow alleys and antiquated buildings, not designed for present uses. It has had a heavy increase in motor vehicle registration, as other cities have had in the past ten years. It is fighting for breath, particularly in congested areas, and is now planning relief through provision of off-street parking facilities. Its terminal arrangements are a bit more complex than those of other cities.

Served by sixteen line-haul railroads, thirteen forwarding companies, two hundred and seventy-five truck lines, three or four major barge lines, and being a major transfer point between eastern, western, and southern railroads, and truck lines, it has a major problem of intermeshing its internal commerce with through traffic, and origin-and-destination traffic. Shipper facilities are about the same as in most other cities. Freight depots are about the same. Yet, St. Louis has been able to move the freight traffic without too much impediment to street traffic flow, and without forming lines of trucks waiting to pick up or deliver freight. The difference is in the arrangement.

Local cartage carriers have individual contracts, bargained for as a unit, with railroads, truck lines and forwarding companies, under which they perform principally pickup service for these forms of transportation. Under these arrangements, the cartage carriers place equipment at a shipping dock and the shipper's entire output is loaded directly to the cartage equipment. This will include freight in pickup service, local city deliveries, and could include parcel post, express, air freight and inter-plant movement on the same truck.

When the shipper avails himself of the cartage arrangement there are no delays waiting for pickup trucks; no interruption to shipping flow; no sorting and shuffling of freight to find a lot which had been

set back on the shipping floor along with other lots waiting the individual pickup trucks of each of the line-haul carriers. There is no lineup of pickup trucks waiting their turn to get to the shipping dock to pick up or deliver freight. There is no confusion of men on and off the platform, no shuffling of shipping papers and shipping information.

Minimum Time, Effort, Obstruction

The result is clearing of the platform and relieving of the shipping facilities with a minimum of effort and time, and a minimum of obstruction to other necessary movements. The arrangement relieves line-haul carriers' facilities of delay, and of considerable calling and calling back for pickup service. Results achieved permit a greater use of shipper-facilities for receipt of inbound freight and they expedite this movement.

Generally the cartage operators perform the outbound service. The individual line-haul carriers either make their own arrangements for, or have their own facilities for delivery of, inbound, which seems to be the most efficient method for handling such traffic, providing it is possible to get to the delivery point. The inbound arrangement under the control of the line-haul carrier permits the most economical and expeditious arrangement for load, routing and delivery. The two operations working together produce an intermeshing, rather than a conflict of equipment.

A good deal of study has been given to this problem. In December 1948 the California Public Utilities Commission, as a result of a cost study and analysis it had prepared, concluded that unified pickup and delivery service would cost less, reduce traffic congestion on streets and eliminate to some extent delay time at shipper's and consignee's doors. It noted that carrier objections to such a plan were that the present method of performing pickup and delivery operation is the only way that each carrier is assured of receiving shipments intended for him by the shipper; that more expedited service can be performed, and that the pickup and delivery driver is the real contact man between carrier and shipper.

The Liberty Mutual study previously mentioned was released in June 1950. It found that "an alternate solution to the reduction of

truck movement on city streets is that of consolidating pickup and delivery service so that one carrier would provide the service for all carriers transporting less-than-truck-load shipments in the city." In concluding its study, Liberty Mutual referred to the California Commission's recommendation and stated that—"Since no factual evidence has been brought forward as to the merits or demerits of such an operational plan, it remains a questionable solution."

In 1946, J. Hayden Alldredge, interstate commerce commissioner, proposed a general pooling of all small less-than-car-load traffic. One of his justifications was the seriousness of the traffic problem. In April 1948 the United States Chamber of Commerce, in its report on Urban Transportation, proposed a form of pooling in pick-up and delivery service. When they released their studies, neither the California Commission nor Liberty Mutual was familiar with the St. Louis Plan that follows their recommendations closely. The St. Louis plan preserves the elements of competition; at the same time, it affords a more complete coverage of the problem since it includes service to rails, trucks and forwarding companies, which probably could not be accomplished in any effort toward unity among these competing carriers. The St. Louis Plan has demonstrated its sound practicality in the level of the charges paid for the service, as compared with charges paid in other cities of comparable size and comparable cost factors.

However, The St. Louis Plan deals only with the outbound movement. It does not solve the inbound problem except as it contributes flexibility to shipper facilities through the elimination of numerous additional trucks that would be calling for pickups if the plan were not operative.

Economic Soundness Questioned

As a practical problem, we question the economic soundness of an effort to accumulate inbound traffic for a given receiver by sending a truck from depot to depot for that purpose. A unified inbound service would not approach the problem from this standpoint, and would not recognize the real bottle-neck as being the shipper facilities. The dispatching of an individual truck for a particular shipper's inbound would involve many problems; notice that the goods were

on hand, congestion of carrier's terminal facilities while waiting for pickup of the freight, delay to the shipment, and a practical impossibility of being able to serve the approximately 100 to 300-odd carriers for the particular shipper. In brief, the cost would be prohibitive. On the other hand where the condition demands some action looking toward relief, definite consideration should be given to the provision of off-premises receiving facilities designed perhaps for the receipt of less-than-truck-load shipments weighing less than 5,000 pounds.

Congested districts present special problems. The size of equipment operated in such areas for pickup and delivery service should add to the flexibility, and while moving, should be designed to create a minimum of interference with traffic movement. It should also be designed for loading and unloading while parked parallel to the curb. While this is not always possible it is a desirable objective. Local conditions will determine most suitable dimensions for trucking equipment.

In St. Louis our experience has generally established straight trucks with 12-foot bodies and 16-to-20-foot trailers as most adaptable to our conditions for service in congested areas. Some cartagemen, experimenting with cab-over-engine equipment have achieved flexibility with somewhat longer bodies. It is possible that similar dimensions would be suitable for other cities. Where the freight to be handled cannot be accommodated on such vehicles within such areas, the necessary pickup or delivery should be effected at hours which do not conflict with public usage of the street.

With respect to curb parking for commercial purposes it is generally accepted that the maintenance of commercial districts requires that businessmen in these areas be permitted to do business at a cost competitive with that of other businessmen, located in other areas. In view of overtime factors present in most union contracts (not only of the trucking industry) it is necessary that the freeing of our traffic arteries include provision for receipt and shipment of goods during normal business hours.

The problem is complicated. Many suggestions have been made for its correction, including absolute bans on truck movement, except at hours beyond normal business hours. This type of solution

destroys the purpose for freeing the traffic movement since it forces a decentralization of business when freer traffic movement to preserve centralization is the real objective.

I think the problem in each instance is local and must be studied at that level, the purpose being to free traffic movement, preserve reasonably normal business conditions, and to foster the convenience of the public. I hesitate to suggest hard and fast rules, but I do believe that much can be accomplished in negotiations between truck users, city officials and industry. Such negotiations eventually lead—*after a thorough understanding of the problem by the parties*—toward regulation for those not sufficiently enlightened to conform to whatever program may be found in the best interest of all. In this connection, perhaps the size of the equipment is an important factor.

It is also possible that during peak hours bans might well be imposed in certain areas, but careful study should be given to the purpose of the ban and the effect on existing truck movement in relation to the purpose sought to be achieved. Peak-hour bans of *moving* trucks do not necessarily accelerate traffic movement. On the other hand, peak-hour bans of loading and unloading operations might be of benefit.

Our experience is that morning peaks are flexible, the traffic flowing smoothly and without interference by normal commercial truck operation. The afternoon peak could be seriously impaired by general pickup and delivery operations after 4.30 p.m. in congested areas. However, garment areas and loft districts present a special problem. Generally, the trucking industry avoids pickup and delivery operations after 4.30 p.m., considering them as being wasteful. On the other hand there are cases that arise not too frequently, where an emergency may require service during these hours. Again I think the objective is one to be handled carefully, looking toward an enlightened viewpoint for its real solution.

Two Other Solutions

Many other solutions have been offered to this pickup and delivery problem. I shall comment on two of them. The first is the provision of Union Freight Terminals. The example most frequently referred

to is the Port Authority Terminal in New York. It apparently has not proved its purpose. It is not profitable, and it has not found acceptance by the trucking industry.

There is a little history behind this. At the beginning of the trucking era, many carriers found quarters under a common roof. In practically every city there were one or more Union Terminals from which motor carriers operated. As the carriers grew, they did not continue to find common tenancies, but each sought and developed his own location. Why this result if Union Terminals achieve economies?

The Union Terminal idea can extend benefits, if any, only to those carriers who can find housing under its roof. The type of building required to house fifty motor carriers, under such an arrangement, is almost inconceivable.

The principle of load consolidation in pickup and delivery service would require extra handling and rehandling within the terminal, plus all the complexities of sorting, shifting, routing and transferring from carrier to carrier. I do not believe that Union Terminals solve the problem, and aside from operating complexities, believe that history supports this view.

Another thought, with which I am not in complete agreement, is that the provision of more shipper facilities is the answer. We must look at this from the standpoint of total economy. The provision of more shipper facilities, assuming the existence of adequate land area, must require the provision of more personnel to expedite movement. Whether this is sound or practical depends upon the facts at each location. The more logical approach to the problem is an examination of the arrangements under which the facilities are being used, and the application of good judgment, and sound planning for the use of existing facilities to their maximum efficiency.

The Role of Traffic Engineers

Where do Traffic Engineers fit in this field?

(1) It is of vital importance to these professional men to understand the business problems inherent in truck transportation.

(2) They should understand the difference between truck miles and

ton miles; by which I mean that if it is possible to handle a city's commerce with fewer trucks thereby relieving the street burden, they should understand the ways or possible ways in which this can be accomplished.

(3) Under the St. Louis Plan the results have been achieved through cooperative action of local cartage men, railroads, trucklines and forwarding companies. It would seem that any approach to the problem would have to come through conference with representatives of these agencies. However, the shippers' problem in this traffic congestion is typified by lines of trucks waiting at plants and buildings for an opportunity to pickup or deliver freight. It is an acute condition, of which they are conscious. The St. Louis Plan would offer some measure of relief. Industry participation in these conferences could be influential in working out arrangements to simplify the truck traffic problem. The adoption of the plan, industry by industry, would permit development of the solution, without too violent an upheaval in present arrangements.

(4) Although not previously mentioned, zoning codes can make some contribution to solution, through the requirement of off-street loading and unloading facilities. In and of itself, this will not do the job. It merely removes from the path of the traffic stream the number of vehicles which can find berths in off-street facilities. There must be further flexibility within the buildings themselves in the internal handling of commerce and in the arrangements for the movement to and from the building of the commerce. Zoning and building codes up to this time have not been developed to the point where internal flexibility is a subject for consideration. Nevertheless it is an important factor in the traffic problem.

In conclusion, I do not presume to offer the answers; rather I am attempting to develop the facts not readily apparent which are contributing to traffic congestion, and at the same time suggest a method of cure that will preserve to the maximum extent, values which are now threatened by traffic stagnation.

How About Vehicle Speeds?

J. E. JOHNSTON

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VEHICLE speed has become a highly controversial subject. Generally speaking, the public has little consistency in its thinking so far as vehicle speeds are concerned. The public has encouraged the development of higher speed motor vehicles and highway facilities as a boon to our transportation economy and then sits up nights developing ways and means to restrict these higher speeds with unreasonable speed laws and traffic control devices.

The public wants straight, smooth, wide, level highways, but man protests the speeds which ordinarily accompany these improvements. People want more powerful, stronger, lower, streamlined vehicles to attain faster speed with greater ease, safety and comfort, and then talk about putting governors on cars. We need to decide once and for all what the real objectives are in our transportation economy and then hold to a straight course in this direction instead of swinging like a pendulum between those improvements that make faster transportation possible and those that tend to retard the free-wheel developments.

"Speed" and "safety" have been expounded together in many varied forms. In fact the attempt to relate these two words has contributed in large measure to the confusion and lack of consistency in the

public mind. Frequently quotations are made, based upon records of mass traffic accident statistical data, to the effect that the outstanding contributing cause of traffic accidents is "speed too great for conditions" and "exceeding the legal speed limits."

Few people would disagree that in all probability had the drivers of one or both vehicles involved in the traffic accident been going a little more slowly the accident might not have occurred. This is true whether the speeds of the vehicles involved were ten or sixty miles per hour. But where is the point at which drivers' demand for mobility is equal to the price they are willing to pay? In regard to "exceeding the legal limit," a fact not generally realized is that few vehicles, especially in cities, are operated at speeds less than the legal limit except in heavily congested areas. Because of this basic driver-characteristic a traffic accident would seldom occur when the vehicles involved were not "exceeding the legal speed limit."

What is Safety?

The problem in using the word "safety" is that its meanings are primarily relative. The question can be asked, "What is safety?" It has been well stated that for complete safety so far as automobiles are concerned there is only one solution—confiscate all spark plugs. In other words an element of hazard enters automobile operation the moment the wheels start to turn. A large percentage of traffic accidents occur at unusually slow speeds. In Nebraska 26 per cent of all reported traffic accidents occurred at speeds less than ten miles per hour and 73 per cent were reported occurring at speeds of less than 30 miles per hour. It is true that the number of fatalities per accident increases as the speed at which vehicles were traveling at the time of accident increases. Yet it should be pointed out that our Nebraska records show that 69 per cent of our fatalities occurred in accidents involving speeds of less than 40 miles per hour, or speeds that are not normally regarded as excessive. The greatest percentage of fatalities occurred at speeds between thirty and forty miles per hour.

It could be argued from the facts above that the problem centers around speeds that are too slow and maybe such arguments are not

unreasonable. People buy automobiles for the purpose of mobility. They certainly buy these vehicles with some appreciation of the hazards of driving. It is evident that the advantages derived from free-wheel transportation more than outweigh the hazards, and even the hardships endured in many cases to afford this transportation. The point of contention seems to be "how much mobility shall the public permit itself to have?"

The problem exists primarily because of the wide range of individual opinion as to what safe speeds are. Each driver apparently sets up his own factor of safety. This is dependent upon his vehicle, the roadway, weather conditions, marginal developments, his own physical fitness and the urgency of his mission. On a typical city street the following distribution of vehicle speeds might be found:

Miles per hour	*Percent*
Less than 20	12
20-25	32
25-30	32
30-35	17
35-40	4
Over 40	3

On a typical high speed highway the following distribution of vehicle speeds might be found:

Miles per hour	*Percent*
Less than 30	1
30-35	1
35-40	3
40-50	8
45-50	19
50-55	26
55-60	21
Over 60	21

In the typical case related to cities it can be noted that 32 per cent of the drivers operate between the speeds of 20 and 25 miles per hour. Apparently these drivers consider this the best speed through the area involved. Furthermore they would have some disapproval of drivers exceeding this speed and would tend to condemn such

drivers as reckless and a menace on the street. Also this group might be found raising its voice before city governing bodies, demanding speed control. But how about the next group of drivers also numbering 32 percent? They would feel persecuted by the attitude of the first group but would feel toward the still faster group the same way the first group feels toward them and so on ad infinitum.

Drivers do not accord to other drivers the same privileges they grant themselves. Each driver tends to believe that he is the only safe motor vehicle operator on the street or highway. This point is best illustrated by the attitude of people in many smaller municipalities where high speed highways pass through the city. These people will not tolerate the same vehicle speeds through their community that they themselves exceed or equal in adjoining communities of similar nature. Evidently the "foreign" drivers about which everyone complains are actually the local drivers of adjoining cities.

"Realistic Attitude" Needed

Where is the basis of conciliation in the jumbled attitude of the driving public in determining safe speeds? Differences can only be reconciled by encouraging a "realistic attitude" on the part of all drivers. Such a realistic attitude can be achieved only by acquainting the public with facts about traffic accidents, speed characteristics, and the virtues of the "other driver" on the highway.

We can start by asking, where is the reckless, inconsiderate, speeding, and drunken driver? Actually he is extremely difficult to find. To be sure he is there, but not nearly in the degree to which we have been led to believe. Who is a "good driver?" One commonly accepted definition of a good driver is "one who, starting on a journey regardless of the roadway, weather, vehicle, or traffic, arrives at his destination without having any trouble himself or without causing anyone else any trouble." If this is a good definition of a good driver, there are actually very few poor drivers.

In order to find the poor driver, we need some measure of what is "poor." This measure can best be determined by discovering what is left over when the good driver has been taken out. Dr. Harry R. DeSilva, while at Yale University, found in one of his driver

behavior studies covering a six-year period that 80.9 percent of the drivers do not get involved in serious traffic accidents at all; that another 15.2 percent have only one accident each; and that the remaining 3.9 percent account for 36.4 percent of all accidents.

It is reasonable to assume that the poor drivers have traffic accidents. In Nebraska only three out of every hundred licensed drivers are annually involved in traffic accidents. This three percent includes those who have had only one accident as the result of unusual circumstances or the momentary unthinking act of one who might normally be considered a good driver. Apparently then the majority of our drivers are good drivers and the poor driver is included in the small percent who account for the larger proportional share of all accidents.

We can then, by this reasoning, take a new look at our fellow drivers. We can conclude that he is as much interested in traffic safety as we are. Just because he doesn't drive the way we do is no reason to believe that he is wrong and we are right. After all no one drives exactly the way we do. Drivers tend to exclude themselves in their appraisal of the "other fellow." Don't forget you're the "other fellow" to the "other fellow."

Analyzing the responsibility of speed in the causation of traffic accidents would be simple if all accidents involved speeds at the top of the speed range. The records show that the majority of accidents occur at speeds that would normally be considered safe. In other words low speeds are frequently too fast in certain combinations of circumstances. Furthermore speeds usually low and reasonable to the large majority are too fast in terms of driver ability for a few.

Driver-Behavior Studies

Our hundreds of studies have proved that good drivers vary their operating characteristics in accordance with the roadway conditions and marginal developments they encounter. Our studies also show that drivers do not vary these operating characteristics because of speed limit signs, warning signs or other devices designed to control speeds.

Variation in driver behavior according to traffic conditions is

illustrated in Figure 1. The various bars represent the average speed and the 85 percentile speed at the point of slowest travel in all of the cities and villages located on Highway U.S. 30 across Nebraska. Speeds can be noted varying from an 85 percentile of 19 miles per hour up to 57 miles per hour. One 85 percentile of 62 miles per hour is shown for the open highway. This 85 percentile would be typical on all highways between each of the cities shown.

In studying the data charted, it might be helpful to think of the speeds shown in each city as representing the same group of drivers; that is, the same group of drivers, included within an 85 percentile of 44 miles per hour in Bushnell, would be included within a speed of 26 miles per hour in Kimball. Although Figure 1 represents vehicle speeds across this highway taken during the summer of 1949, checks were made in previous years and in all cases the operating characteristics were found to be almost identical. The speeds shown on this bar diagram therefore represent the fixed operating characteristics of drivers through the various areas.

When the first checks were made, the legal speed limits posted through most of these cities and villages were 20 to 25 miles per hour. An effort has been made in the majority of these towns to adopt the speed limit which will include the 85 percentile shown. Only 12 of the 43 locations shown have not yet adopted the recommended limits and a number of these have no need for speed zones. This program has resulted in raising speed limits from 5 to 20 miles per hour over what they were previously. An interesting fact is that raising the speed limit has not resulted in higher speeds as many people believed would occur, and has in no case made any significant difference in the average speeds and the 85 percentile speeds.

Our records indicate that posting of higher speed limits has not resulted in increased traffic accidents, but actually in a marked decrease. Comparing the "before" and "after" experience of cities and villages where such comparisons are possible revealed a decrease in traffic accidents of 11 percent, a decrease in fatal accidents of 200 percent and a decrease of nonfatal accidents of 16 percent. After adjusting the "before" and "after" traffic accident experience in accordance with variation in the fidelity of reporting, results indicate a 34 percent reduction in traffic accidents

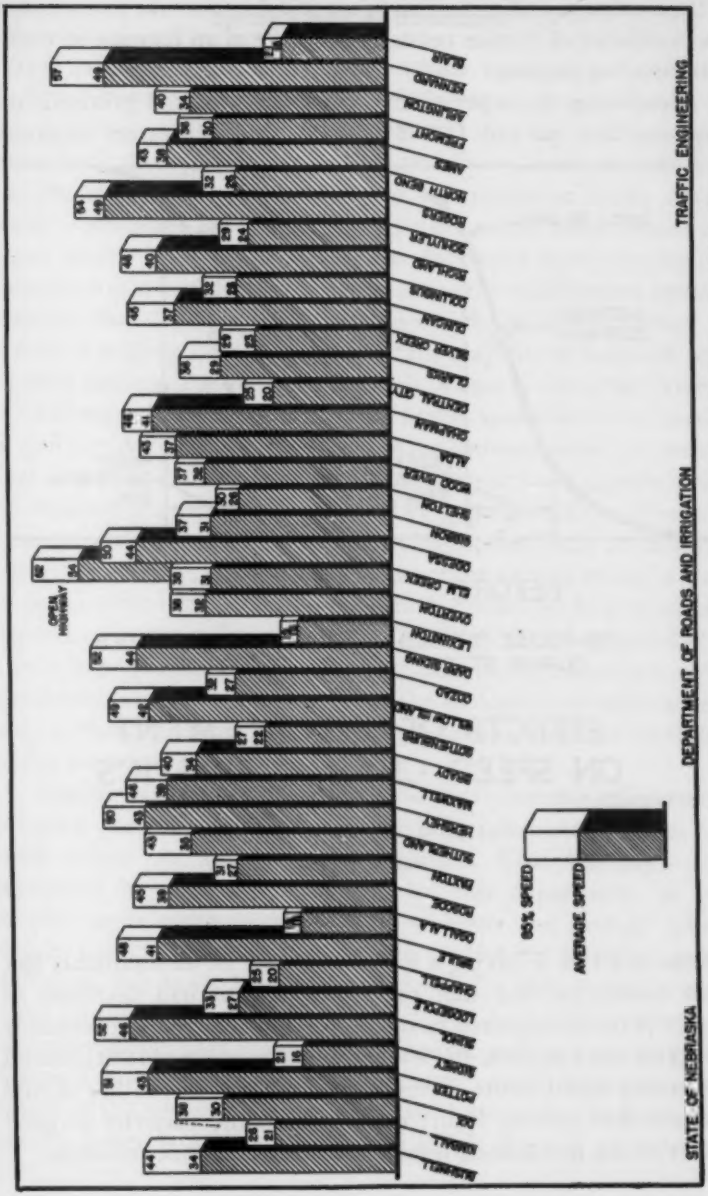

FIGURE 1. Comparative study of vehicle speeds in cities on highways U.S. 30 across Nebraska

in these cities and villages. This figure still does not take into account the possibility of further reduction because of an increase in traffic volume of 14 percent.

Comparing the experience of these cities located primarily on Highway U.S. 30 and U.S. 6 with all other cities on Highway

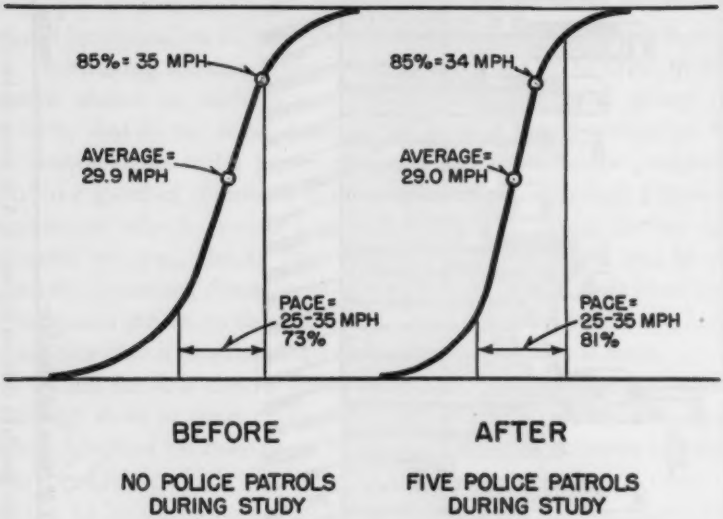

FIGURE 2

U.S. 30 and U.S. 6 having a high percentage of unreasonably low speed limits, we find that these other towns had decreases of only 21 percent compared to the 34 percent referred to previously during the same periods. In view of these facts one could not contend that raising speed limits causes traffic accidents, but rather should conclude that posting limits reasonable to the majority of good drivers results in a definite tendency to decrease traffic accidents.

Speed Limit Enforcement

When meeting with city councils, which usually was necessary to set up a program to encourage the adoption of reasonable speed limits, someone nearly always complained that the recommended speed limit through the area was too fast. Speed limits *should* seem too fast for the majority or they are not maximum limits. Many traffic authorities have posted minimum rather than maximum speed limits. This whole system has depended upon developing tolerances that were left to the discretion of the enforcement agency, a system that depends upon personal moods for its consistency. It results in making law violators out of the majority of normally law-abiding citizens. Furthermore it develops rear-view-mirror drivers.

Enforcement agencies argue that higher speed limits are harder to enforce. Actually speed limits that are unreasonably low are the ones difficult to enforce. It would be hard to conceive of apprehending all violators of a speed limit exceeded by 75 percent of the drivers. A posted speed limit must be self-enforcing. Speed limits are not self-enforcing when more than five percent of the drivers exceed a limit in excess of the legal limit plus not over five miles per hour tolerance depending upon conditions. Most enforcement agencies agree that in areas where speed is a problem, apprehension of even one percent of the drivers would be difficult. From the standpoint of enforcement only, nothing can be gained by posting regulations beyond the ability of the average enforcement agency.

The fact is that even the application of a reasonable enforcement program does not change the operating characteristics of the good driver on any street or highway. This has been substantiated by a study carried on by this department in one of our larger cities in an attempt to lower the average speeds and 85 percentile speeds through the application of enforcement. Although this study has been under way for only approximately three months, there has been no change so far in the measures of central tendency over what it was before the program was initiated. Figure 2 shows typical "before" and "after" speeds from this study. Effects of the enforcement program have been noticed in the higher speeds; fewer vehicles are exceeding speeds of 40 or 45 miles per

hour than before. Here lies the value of enforcement which is an important contribution to traffic regulation.

Frequently considerable indignation is expressed by public officials locally in charge of traffic control when they are told that some unreasonably low speed limit cannot be enforced. The public should realize however that any regulations contrary to the demands of the majority, whether it is speed control or any other activity, are unenforceable.

The work of safety organizations in encouraging slower speeds is highly commendable. It would be well if the public could be convinced that its desire for mobility is not in keeping with the price it pays for mobility in terms of traffic accidents. The facts however were summed up when it was said, "When the public wants safety it will have safety and not until." But traffic regulations should not be the channel for a driver safety program. Most people don't want to be reformed and have little regard for unsolicited methods designed for this purpose even if coupled with some well-intended legal restriction. Attempts of many authorities in charge of traffic control to use this practice have resulted in drivers' complete disrespect for traffic regulations and traffic control devices. We should have learned by this time that the safety concepts of one group of drivers cannot be forced upon another group of drivers.

Summary

The matter of vehicle speeds and safety varies widely in the opinion of drivers. Seldom do two drivers agree on the best driving practices. Driver opinion *expressed verbally* is an unreliable basis for determining safe driving habits or traffic regulations even including those drivers who are qualified traffic experts. Driver opinion is of value only as it is reflected in *driving habits*. Actually, despite the wide difference of driver opinions, the majority of drivers are good drivers. Speed signs do not change average speed characteristics. Enforcement does not change average speed characteristics. People drive according to their own appraisal of roadway and driving conditions. Traffic accidents can be reduced by adopting reasonable speed limits even though a higher limit. The posted speed has

little relation to safe speed since this varies with drivers and traffic circumstances. Traffic regulations and traffic control devices should not be the channels for driver safety programs.

We have developed our free-wheel transportation system for the purpose of mobility. Let us not allow unwarranted and unreasonable traffic control devices to spring up at every cross road in our country because of the fears or whims of some individual or even group of individuals who have not studied the facts of the case. Let us protect this heritage which is ours in greater freedom of movement. Let us keep a proper balance between our "stop" and our "go" signs.

The New York State Thruway

FRED W. FISCH

Mr. Fisch has been Deputy Superintendent of Public Works for the State of New York since July 1950. He previously had served the City of Schenectady in the fields of engineering and public works, city planning and public housing. In 1934 he had been appointed a technical consultant to the Schenectady Municipal Housing Authority. In 1938 he was Director of the Department of Traffic and City Planning. In 1946, he joined the staff of the New York State Department of Public Works as Principal Civil Engineer of Planning in the Bureau of Arterial Route Planning. In September 1947 he was promoted to Director of that unit. In 1949, he became the first Director of New York Bureau of Highway Planning. Mr. Fisch is a member of the New York State Association of Highway Engineers, of the New York State Society of Professional Engineers, of the Albany Society of Engineers, of the National Society of Professional Engineers, of the American Society of Planning Officials, of the Institute of Traffic Engineers, and of the Highway Research Board.

A HORSELESS carriage chugged down Broadway fifty years ago with three bicycle cops in wild pursuit. Finally, the motorist was arrested for speeding at eight miles an hour.

That was New York City, 1900.

The motor car was then merely the toy of rich and daring men. Its future seemed so limited that some owners were seriously suggesting that automobiles, like boats, be identified by name.

Now, all that is as dated as a stereopticon. Today, motor vehicles are numbered in the millions; the horsepower of their engines measured in the hundreds. In the half-century since the first faltering motor car appeared, a tremendous industry has developed, creating a whole new range of occupations and affecting our economy so powerfully that the automobile has become almost the trademark of the nation.

Highway transportation alone is valued at nearly $35 billion a year, and about one in every seven employed persons in the United States is engaged directly or indirectly in providing this service.

Throughout the nation, nearly 45 million vehicles are in use, of which 3,882,155 are registered in New York State.

This overwhelming tide of cars and trucks has created a major problem called Traffic, and its corollary, Highways. These problems, in turn, have resulted in new approaches to highway design and finance which in New York State are typified by the Thruway.

Why the Thruway

The Empire State's superhighway was conceived in answer to traffic pressures mounting steadily on a highway system designed largely for the needs of 1930 and neglected subsequently because of the depression, the war, and other emergencies.

Highways become obsolete on two counts: structure and function. In a joint survey of the New York State highway system, the Department of Public Works and the U.S. Bureau of Public Roads found that 5,994 miles, or 42 per cent of our highways are inadequate for present traffic. Nearly 65 per cent of the total mileage was built before 1930 and these highways are carrying about ten times as much travel as they did thirty years ago.

Much of the blame for structural deficiencies may be laid to the planning policies of a generation ago, when the emphasis was often more on mileage than on service. Road builders tended to forget that pavement should be built to serve at least 20 years, and the highways were designed and constructed largely according to current rather than reasonably foreseeable needs.

Highways built in haste have not been able to withstand the pounding they have taken, especially within the past few years. They are the roads that have deteriorated physically. They are the narrow, overcrowded highways that in 1950 contributed to 104,629 personal injury accidents which claimed 1996 lives and injured 147,245 persons in New York State. Property damage accidents totaled 211,505. Together, last year's personal injury and property damage accidents cost $72,677,731, a figure that takes on additional significance when placed beside the $95,987,000 spent for state highway purposes in 1949, the last year for which data is available.

The physical deficiencies of highways are among the causative

factors in this costly accident record, but they are not alone entirely responsible. Careful analysis of almost any accident will show that the road, the vehicle and the driver, each to a greater or lesser extent, share the blame. Indeed, a highway may be well-designed and well-built from the criteria of grade, pavement, and lane width, and still have a high accident rate. In such instances the highway has become functionally obsolete, largely because access to it is unlimited. It is unable to accommodate the traffic pouring on to it from many different sources. Commercial enterprises and residences along its route have created a multiplicity of grade intersections, which, together with those for other highways and railroads, set up serious traffic hazards. Pertinently, the failure to yield right-of-way at intersections is one of the two driver failings most responsible for highway accidents. The other factor is speed.

It is to relieve the inadequacies of the existing highway system and at the same time to provide for future traffic needs that the New York State Thruway is being built.

Thruway Design

The Route. The Thruway is planned as a 535-mile limited access highway, to be built on new location from New York City along the Hudson and Mohawk River valleys and across the state to Buffalo and the Pennsylvania line. Spurs will be provided to Niagara Falls and to the borders of Massachusetts and Connecticut.

The route of the Thruway proper traverses the most densely populated areas of the state. In a band averaging 20 miles wide through which the superhighway is being built live 85 per cent of the state's people, who own and/or operate 79 per cent of all the motor vehicles. The relationship between population and the need for traffic facilities is so obvious that it is seldom mentioned. Nevertheless, population figures, tedious though they may be, are basic to realistic highway planning.

The Thruway proper will by-pass urban areas with the exception of the New York City and Buffalo terminals. However, experience has shown that by-passing does not hold for the larger cities. About 90 per cent of the traffic approaching cities has origin and destination within the city itself and therefore cannot be

diverted. For that reason the Thruway is being closely correlated with plans for arterial highways in major cities along the Thruway route. For example, Schenectady, one of the leading industrial cities, will be served by a spur leading to an interchange with a proposed cross-city route. The spur itself will extend directly to the General Electric plant, and in conjunction with the planned arterial system give access to another important manufacturing establishment and to the central business district.

However, in the case of smaller communities, a larger percentage of traffic is by-passable and these are the areas which will benefit most from the diversion of all non-local traffic.

The heavily populated areas of the state are also largely industrialized and it is in these areas that heavy traffic is generated. New York City has 81 per cent of the manufacturing establishments, all of which are absolutely dependent upon adequate transportation. The remaining 19 per cent, including much of the state's heavy industry, are located mainly in the Thruway belt.

The Roadway. Highway design, for the first time in history, is today challenging automotive design. The new principles of highway engineering are productive of roads that are better than the cars that travel over them.

These principles, all of which are incorporated in Thruway design, are: access control, which implies a liberal policy of right-of-way acquisition and the elimination of grade intersections; separation of opposing traffic streams; adequate landscaping, easy curvature, low gradients, adequate pavement capacity, and the provision of service facilities.

Access Control

The most important single feature in Thruway design is probably access control. A controlled-access facility, especially planned for through traffic, restricts rights of entrance and exit between the expressway and abutting land and limits connections with other highways. Owners and occupants of abutting property have only a restricted right or easement of access, light, air or view.

This is almost a revolutionary concept, and only within the past

13 years have steps been taken to adopt it. Controlled access facilities are now approved in about two-thirds of the states, but there is still a need to acquaint the general public with the now-proved advantages of this type of highway.

Access control provides the most economic and most efficient means for the uninterrupted flow of traffic. It is the only way to protect highway investment and to prevent the depreciation and blight of adjacent real property.

The minimum takings for Thruway purposes, including construction and marginal control, are 200 feet in width. Right-of-way acquisitions will vary above this figure, however, for the provision of traffic interchanges and public facilities. A complete clover-leaf intersection, for example, will cover approximately 60 acres.

Grade Crossing Elimination

The elimination of grade intersections is one of the most important features of the Thruway from the standpoint of safety and efficiency. More than 450 major structures will be required, including traffic interchanges, overpasses and bridges. Connections will be built to major state routes which will feed and receive Thruway traffic.

The failure to yield right-of-way at intersections has been cited earlier as one of the two factors most responsible for highway accidents.

In 1950, 24.3 per cent of the fatal accidents in New York state occurred at intersections; 44.8 per cent of the personal injury accidents, and 46.5 per cent of the property damage accidents.

Similarly, a study by the Ohio Department of Highways has shown that 25 per cent of all rural accidents occur at intersections and private driveways. Data from a South Carolina study indicates that accidents per mile of road are at least twenty-five times more frequent at intersections than on straight stretches.

Divided Traffic Lanes

Thruway specifications call for the ultimate construction of three traffic lanes in each direction, 37 feet wide and separated by a

Typical overpass on the New York State Thruway

minimum mall of 20 feet. The mall width will in some locations extend to 150 feet or more.

The separation of opposing traffic streams, although in itself an important element of contemporary highway design, does not stand alone as an effective safety measure.

In New Jersey, the conversion of a four-lane highway to a divided highway was credited with a reduction of 83.3 per cent of fatal accidents, 48.5 per cent of personal injury accidents, and 17.6 per cent of property damage accidents.

However, special study of the type of accidents before and after the physical separation of the highway showed that the decrease occurred *between intersections,* and that the number of accidents at intersections remained fairly constant.

Obviously, divided traffic lanes do not have a maximum effect upon accident reduction unless coupled with elimination of cross-traffic.

Thruway Landscaping

In its route across the state and to boundary lines on the east and west, the Thruway traverses a considerable variety of soil and climatic zones, each with its distinct plant associations.

Landscaping is an integral part of the overall design of the Thruway, and newly graded surfaces will be blended with the adjacent topography. All new plantings, most of which will be concentrated at the major traffic interchanges, will be consonant with natural features.

The reasons for the exceptional care that is being taken with Thruway landscaping are not entirely aesthetic, although one of the intangible values of an expressway or parkway is its beauty.

While the Thruway will permit the passage of traffic as in a sealed tube, its landscaping takes into consideration the human factors involved. Unquestionably, the montony of scenery and sound on existing expressways has caused drowsiness resulting in serious accidents. For that reason, the landscaping will vary, as will the mall widths, in order to maintain driver attention.

Objectionable off-scapes will be screened, and mall plantings will reduce the hazards of headlight glare. Last year, 1097 of the 1996

highway deaths occurred after dark, and blinding headlights were blamed for thirty-one fatal accidents.

Studies by the American Association of State Highway Officials indicate that a thirty-foot space between opposite direction travel lanes will alleviate the dazzling effect of oncoming lights. Shrubbery will also prove effective, and compensate considerably when separation strips are narrower than the recommended width, as in some areas where costs of right-of-way or technical and traffic considerations warrant a reduction.

Other Engineering Features

The number of traffic lanes now being built is based upon present traffic volume and requirements in the immediate future. For example, heavy traffic in the Buffalo area and in Westchester County calls for the construction at once of three lanes in each direction, or a total one-way width of thirty-seven feet. In most sections, however, two lanes are being built in either direction, one twelve feet wide, the other thirteen. Additional twelve-foot lanes will be constructed as required. Stabilized shoulders at least nine feet wide are included in the design.

The maximum grade is 3 per cent, the minimum radius of curves 2,800 feet, and the minimum vertical and horizontal sight distance is 1000 feet.

Service facilities, as restaurants and gas stations, will be provided at convenient intervals, but their number and location will be regulated in the interest of safety.

Thruway Economics

An economic evaluation of the Thruway must await the completion of considerably more mileage. Some indication, however, may be secured by a comparison of existing expressways and highways of ordinary design. The economic considerations include: safety, capacity, effect upon adjacent property values, and cost of motor vehicle operation.

Traffic lanes divided by central mall on the New York State Thruway

Incorporating the best in highway design and engineering skills, the New York State Thruway will offer motorists the ultimate in driving ease and safety. It will be entirely free of stoplights, cross traffic, hills, and sharp curves, as the photo above shows.

Safety. The Thruway will be as safe as modern highway engineering can make it. Like the Pennsylvania Turnpike, it is proof against every road hazard except the fool and his car.

Highway builders can control access, eliminate crossings, smooth out grades, reduce curves, divide traffic and extend sight distances, but they cannot inject responsibility and prudence into a heedless motorist. Ultimately, highway safety is in the hands of the man behind the wheel.

Controlled access highways, however, do show remarkable safety gains. During the first four months of 1950 the fatality rate on the famous Merritt Parkway in Connecticut was 3.2 per cent per 100 million vehicle miles, compared with a death rate of 5.3 on the remainder of the state system. On the Boston Post Road, which parallels the Merritt Parkway, the rate was 11.2 per 100 million miles. The Arroyo-Seco had a fatality record of 3.5 per million miles, whereas the rate for the rest of the California highways was 6.4. The national average for all highways is 7.4 per 100 million vehicle miles.

The record of the Pennsylvania Turnpike gives rise to a conjecture on the need for educating drivers to the intelligent use of superhighways.

During the first six months of Turnpike operation, the fatality rate was double that for the nation as a whole. Ten years later, in 1950, the Turnpike Commission could point to a rate of 2.9 as compared to the state-wide rate of 5.6. And during the 1950 Memorial and Fourth of July holidays, when Turnpike travel reached an all-time high, there was not a single fatal accident!

Reports of the Turnpike Commission show that most accidents on the superhighway involve sideswiping or rear-end collisions. Apparently, drivers need to condition their spatial judgment to the greater speeds permissible on superhighways. Allowances should also be made for the fact that vehicles tend to move farther toward the center of the highway as speed increases. This accounts largely for sideswiping.

Thruway design speed is seventy miles an hour. But the very process of making a highway safe for any given speed makes it travelable at a much higher rate. This statement is not to be

interpreted as encouraging speeds in excess of the limit, for the Thruway will be patrolled.

It should be borne in mind, however, that speeds of different units in the traffic stream vary considerably, and this variance is a potential hazard. The Thruway, with its wide lanes, will provide room for motor vehicle movement at rapid or moderate rates of speed.

Capacity. It has been estimated that the Thruway will be capable of carrying 40,000 vehicles daily in either direction.

Last year, special surveys were made in order to determine potential Thruway traffic. Detailed information on volume and classifications will be available when that data has been thoroughly analyzed.

A comparison of two similar roads in New York City will illustrate the superior carrying capacity of the controlled access facility. The Sunrise Highway was a four-lane concrete roadway six miles long and intersected by 13 grade crossroads. The Grand Central Parkway was a controlled access, four-lane roadway, seven miles long with 15 grade separations. At full capacity, these traffic arteries served equally congested centers of population and feeder routes. But the Sunrise Highway carried only 8,000,000 vehicles a year; the Grand Central Parkway, 15,000,000. In addition, the 13 roads intersecting the Sunrise Highway were congested because of the crossings at grade, while the 15 grade separations carried traffic across the parkway in uninterrupted movement.

Because of its capacity, the Thruway will absorb much of the traffic overload on existing highways, making them safer for the vehicles remaining and reducing considerably the costs of maintenance and operation.

Adjacent Property Values. Plans for limited access highways are nearly always greeted with protests from property owners who feel that their land values are threatened and businessmen who think that by-passing spells their ruin.

Although extensive studies are yet to be made, available data indicate that both are wrong. Experience demonstrates that express-

ways actually increase property values and encourage business activity.

As far back as 1933, the Westchester County, New York, park commission found that property values along the Bronx River Parkway appreciated twelve-fold in the period 1910 to 1932.

The most recent data come from California, where a detailed study was made on property values and business conditions before and after completion of a section of expressway. The highway ran past a small city and through a rural area.

The investigation showed retailers' business improved, largely because the non-buying traffic was cleared from the street. In addition, the average value of business property sections rose from $153 per foot to $208.

Property values in the rural area rose from an average of about $800 to an average of $3000. The highest unit price paid for vacant properties increased from $2300 per acre to $7000 per acre.

"Fly-by-night" roadside enterprise, however, was eliminated, which is generally considered beneficial to the community as a whole.

It is reasonable to expect similar results all along the Thruway. property values in now remote suburban areas are certain to increase noticeably as the superhighway makes possible even greater decentralization of commuter residences.

Cost of Motor Vehicle Operation. Every motorist knows that stop-and-go driving is expensive as well as irritating and time-consuming.

Estimates of actual savings on fuel and tires as a result of Thruway use are difficult to make. Studies in Iowa, however, indicate that a single stop and start uses as much rubber as one mile of ordinary travel, and enough gasoline to travel two city blocks.

The Greyhound Bus Line, one of the best customers of the Pennsylvania Turnpike Commission, reports demonstrable gains in time and therefore business because of Turnpike travel.

Unquestionably, wear and tear on motor vehicles of all classifications is reduced to the minimum on modern highways. Safety gains, too, will effect savings as a declining accident rate is reflected in lower costs of automotive insurance.

Thruway Finance

Plans for financing the Thruway started with the state budget, progressed to a conventional toll system, and finally emerged as a unique combination of bonding and licensing.

The Thruway was to be financed originally from state funds for highway purposes, but in the face of mounting construction costs it was apparent that available money could not be stretched to cover necessary work on existing highways, and at the same time provide for the new superhighway.

Investigation showed that a Thruway toll system would involve considerable expense to the state and undue inconvenience to the motorist. Moreover, tolls would not assure sufficient revenue to finance the project.

In March, 1950, a committee on Thruway finance submitted a report concluding that:

1. Revenues from the sale of special licenses for Thruway use would make the facility self-supporting
2. An independent authority should be created to construct and finance the Thruway
3. State funds should be used for Thruway purposes until such time as the authority completed its financial structure
4. Steps should be taken to amend the State Constitution to "place the State's credit back of the Authority's bonds to obtain a great saving"

That report became the basis for subsequent legislation establishing the Thruway Authority, empowering it to issue bonds up to $500 million in value, and charging it with the construction, maintenance, and operation of a Thruway system.

At the same time, a concurrent resolution was introduced in the Legislature, providing for a constitutional amendment pledging State credit to Authority bonds.

Passed by two separate Legislatures, the proposal goes before the voters in the November 1951 election. If approved, it will reduce

interest charges by more than $100 million over the life of the bonds. This saving, in turn, will be reflected in fees charged for Thruway license plates.

Pending completion of the Authority's financial structure, funds for Thruway purposes have been allocated from state appropriations to the Department of Public Works. An initial allocation of $65 million in 1946 was supplemented by an $80 million grant in the executive budget for 1951-52. All such advances will be repaid.

The Authority undertook independent financing in September, 1950, when it secured a $10 million loan from a group of New York State banks and insurance companies. The loan enabled the Authority to retire outstanding obligations on the two Grand Island toll bridges spanning the Niagara River, over which the Authority had previously assumed jurisdiction. In addition, approximately $8 million of Thruway construction was begun in the vicinity of the bridges.

Highway Needs

Normal, peacetime traffic was already over-taxing our highway system when the present defense emergency burst upon the state and the nation.

Defense production, swinging into high gear and dependent largely on motor vehicle transportation, is now making further demands upon our outmoded roads.

At the same time, top governmental leaders are predicting a prolonged "emergency" in which highways will play a vital role.

In metropolitan areas, the importance of express facilities is particularly striking as civilians face the awful possibilities of atomic attack.

It is for these reasons that the New York State Thruway is being pushed with all possible speed. That it may meet present traffic needs and provide adequately for future requirements, it is being built to the highest standards of design and construction.

THE ENO FOUNDATION FOR HIGHWAY TRAFFIC CONTROL

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